GAS JOURNAL

LIGHT ∴ HEAT ∴ POWER

BY-PRODUCTS.

Founded in 1849 as the "Journal of Gas Lighting."

VOL. CCX.

APRIL TO JUNE, 1935.

LONDON:

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1935.

Gas Journal

LIGHT · HEAT · POWER · BYE-PRODUCTS

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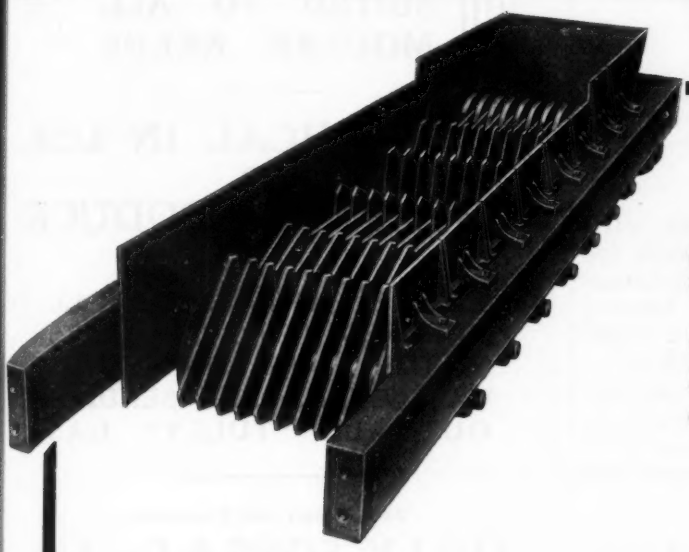

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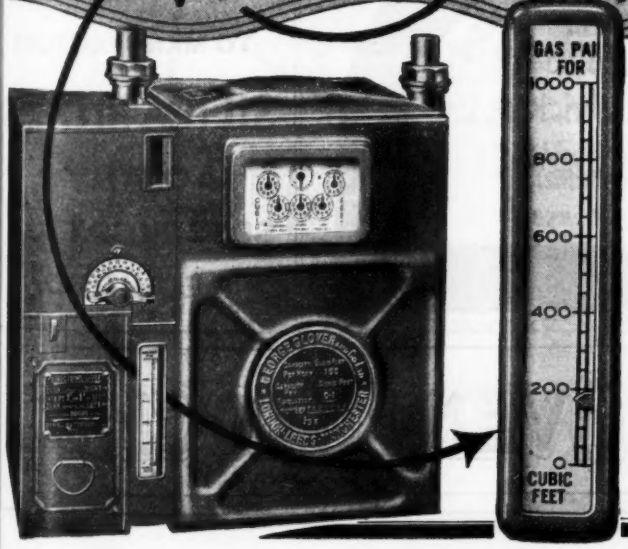

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Gas Journal

APRIL 3, 1935

Vol. 210. 87th Year No. 3750.

Editorial Notes

A Question of Outlook

On Jan. 2 a "JOURNAL" contributor called "Listener-in"—obviously a gas-minded contributor, because he hoped the Gas Industry would "go one better"—described what he called half-an-hour's electrical "variety" to which wireless listeners had just been entertained. "The national network of electrical power," he wrote, "was introduced—or at times introduced itself—in dramatized form, parts of which were amusing and others a little silly; but both were doubtless calculated to convince the layman that, by using more and more electricity, he is doing a national service, and that these ugly pylons 'stretching across hill and valley bring energy to all and new life to the countryside.'"

The last sentence we suppose, from Listener-in's inverted commas, to have been an actual quotation from the electrical broadcast. Well, the other evening it was the Gas Industry's turn (why second we cannot understand, but at least we have not yet had an oil fuel broadcast), and we must confess to a certain disappointment at learning that, as compared with bringing energy to all and new life to the countryside, the gas-works bring aspirin to the sick headache and scent for the sweet young things.

It was undoubtedly a very impious wish on the part of our gas-minded contributor Listener-in that the Gas Industry should "go one better" than the electrical broadcast, because our national broadcasting system is not designed or intended to give commercial competitors the opportunity of going one of any kind over one another. Nor for that matter, one might say, would politics be expected to pull strings, though in the past we have had a great deal to complain about in this respect. Therefore, if the gas broadcast was not calculated in our opinion to be so inspiring to the layman as was the electrical in the view of Listener-in, we are not complaining on the score of detriment to the Gas Industry's business. But we suggest to those of our readers who heard the gas talk last week that they turn for one moment to Listener-in's article on the electrical broadcast in the "JOURNAL" of Jan. 2, p. 30, and then ask themselves whether it would be possible even for the most expert journalist in the world to write-up the gas talk to sound anything like so attractive.

Our object in inviting this small amount of research is to suggest very strongly that the two talks typify respectively the outlooks of the electricity industry and of a large section of our own, and we feel that a quite unnecessary lack of confidence on the part of the latter is working not only to their own detriment, but to that of the whole Industry.

Towards the Gas Age

WE simply must get beyond the rows of little bottles which figured so prominently in Dr. Allan Ferguson's broadcast, and which have figured so prominently in gas exhibitions for so many years. They are pretty, we know, but we want the public to think in terms not of aspirin tablets or prussian blue lingerie, but of well-cooked meals and warm rooms. We want the housewife to think not so much of heating a pound of water through one degree Fahrenheit as of boiling her whole kettle of water jolly quickly at practically no cost. And we feel quite honestly that any gratitude we can inspire for what the Industry has done in the last century and a quarter is of small value compared with the prospect of "energy to all and new life to the countryside." The electrical industry is always full of inspiration for the future, having comparatively little past to talk about. Yet very seldom does one hear any cynicism on the part of the public concerning the fulfilment of the lavish promises made. We feel that there is ample scope for our Industry to make equally lavish promises for the future, and to base the promise of their fulfilment on the aspirin tablets and the century-and-a-quarter service, rather than use these almost as a plea for pity, as a begging request not to desert a faithful old friend. Are we in the Gas Industry not just a little inclined to adopt this attitude, whereas, in this unjust world, the glamour of what we may be able to have is always infinitely greater than our gratitude for what we have to-day, and what we have had for 125 years is most terribly taken for granted.

Now what do we propose? Confidence, and still more confidence—a cry which we have raised on many occasions lately, because we feel that there is every possible justification for it, that it is by no means sufficiently

widespread in our Industry, and that without it we cannot possibly repeat except in parrot fashion, and with no prospect whatever of convincing the public, our slogan about gas being the fuel of the future. On this occasion we are particularly happy in returning to the theme, because a leader in the Industry has recently come into the open as an ally, and like ourselves has raised the " confidence " cry in no uncertain manner.

An Inspiring Message

We hope that those who are in any doubt at all as to *how* to be confident will read and re-read the words which the Senior Vice-President of the Institution addressed to the Manchester District Association on March 22 (reported in the " Journal " last week). Introducing his subject Colonel Carr stated, with a sincerity and conviction which left no room for doubt in the minds of those who heard him, that he would go so far as to say that the Gas Industry was the *foremost industry in point of view of national importance, having regard to the fact that our national wealth was coal.* That we were on the eve of great developments. The eyes of the man in the street had been turned in the course of the last 20 years, for political reasons and others, to the statement that the great public utility of this country was going to be the electrical utility. The electrical utility was a great public utility, and it was a great supplier of light and power. It was not, and could never be, the supplier of heat for industry and domestic purposes that the Gas Industry was, and was going to be in increasing measure in the years to come. . . . *Electricity was not a competitor in the heating field.*

Colonel Carr enlarged on his theme to great effect, and referred at considerable length to the smoke abatement question. Important as we realize this to be, we do not regard it as making a particularly forceful appeal to the individual, though its influence ought by rights to be great with public authorities. But his tie-up of " tariffs " with " confidence " is entirely after our own heart, as readers of our recent editorials well know. We call it a tie-up because we realize that in many cases it requires a certain amount of courage to adopt a new system of charging, while at the same time it is above all our ability to adopt new systems which should give us every confidence in the future. " They had got to take a risk," said Colonel Carr; " even municipalities had got to say they were going to take the risk of commercial loss. . . . He was quite certain, however, that there would be no commercial loss; it was merely a case of the education of the public, the man in the street, that they were a public utility of the country which was anxious to render this service to the nation."

There are many other passages in the speech which we might well quote, but we hope that the whole of it has already been widely read. We must, however, refer to just a few more lines, in which Colonel Carr stated that they were all at the moment assiduously investigating how they could give consumers the benefit of the newly granted freedom, and re-design their charges to enable consumers to replace the solid fuel with which they were polluting the atmosphere by a clean fuel at a cost no greater in total to themselves. We hope he is not unduly optimistic, but we must still confess to some disappointment in the number of tariffs which have so far appeared. We realize it is a matter which cannot be lightly undertaken, but it seems to us a long time since the " antiquated shackles " were finally removed, and still longer since the introduction of the Bill for their removal gave the hint to look pretty thoroughly into possibilities. However, with our faith in the new era perhaps we are unduly impatient, and perhaps this new quarter will bring us many pleasant surprises.

In conclusion—a quotation from a recent letter to the *Evening Standard* by Sir William Ray, Executive Chairman of the British Electrical Development Association: " The two-part tariff has been adopted by over 80% of the supply authorities (including nearly all the larger undertakings), and it has been largely responsible for the remarkable development of electricity supply during recent years, and for the gradual cheapening of electricity which has accompanied it." Truly the public has been well educated for us, which should save us many anxieties.

Hire or Hire Purchase?

The Presidential Address which Mr. Nicholas delivered to the Southern Association of Gas Engineers and Managers on Thursday last, and which will be found on later pages, is a straightforward account of the progress of the Guildford Gas Light and Coke Company since he assumed control in 1922. The record Mr. Nicholas was able to put forward is a very good one, and it shows that in 1935 the Company is well equipped, from the points of view of both works and district, to meet competition. The Address is a story of steady growth in what will be admitted to be a favourable district, and though the story cannot be termed spectacular it contains plenty of evidence of capable administration. Since Mr. Nicholas took charge he has transformed the works to cope with the increased demand for gas, and he has also transformed the district of supply. This is pictured in the two mains plans, one relating to 1922, the other to the present year. In 1922 the mains mileage was 65. Since then a dozen additional villages have been given a supply of gas and the mains mileage is now 140, a small Company, the Cranleigh Undertaking, having been acquired in 1932. This acquisition shows what can be accomplished by gas-minded amalgamation. Sales by the Cranleigh Company in 1931 were 26 million c.ft. Thanks to the greater resources of the Guildford Company the sales in the Cranleigh area were increased by 19% in three years, and during the same period the price of gas was reduced by 2d. a therm. And apart from cheaper gas being available, the consumers in the area have been afforded better service.

As we have mentioned, the area which the Guildford Company serves is a favourable one, and this may be the reason why Mr. Nicholas has abandoned simple hire in favour of short-term hire-purchase of gas appliances, in spite of the fact that electricity consumers can hire at nominal rates any electrical appliance from their local undertaking. And the electricity undertaking makes no charge either for installation or maintenance or for laying the service cable. " In spite of this," says Mr. Nicholas, " the rate of [gas] progress is at least maintained." There are, of course, well-known reasons for favouring hire purchase in that it relieves the gas undertaking of a capital burden and it makes the consumers feel that they are capitalizing their savings by purchasing something from which they obtain a fair return. Mr. Nicholas believes, too, that a consumer who buys his apparatus is less prone to the blandishments of the electrical salesman. For our part, however, we have yet to be convinced that hire-purchase, to the exclusion of simple hire, is to be recommended as an inviolable principle. Our feeling is that every avenue for increased sales should be exploited by all gas undertakings, and one of these avenues is the hire of apparatus. Hire or hire-purchase? Our answer to the question is " Both."

Benzole-Minded Throughout

A SHORT time ago we pointed to the truism that every member of the personnel of the Gas Industry is a potential gas salesman—a truism which, however, is insufficiently appreciated. There is far too much of the "potential" and far too little of the actual. We asked for a more general realization of the enormous possibilities of the sales force within the Industry. This force, if properly harnessed, is capable of swaying public opinion. The starting point is enthusiasm within the Industry and determination to sell the Industry. Each day every member of the Industry should do something to make the public gas-minded, which means, of course, that every member must be gas-minded.

Now what we said about gas applies with equal force to the sales of benzole, a highly important by-product of the Industry. All gas undertakings and coke ovens should use benzole for their motor transport, and all individuals having cars and who earn their livelihoods by the Gas Industry or the Coke Oven Industry should, believing in the industries' products, likewise be enthusiastic users of benzole *and recommend it*. National Benzole Mixture should find an advocate in every gas man and every coke oven man with a car. It is more than regrettable that we cannot affirm that this state of affairs obtains to-day.

Rates and Subsidies

A POINT of considerable importance to gas companies has been decided by the Committee of the House of Commons which has dealt with a Bill promoted by the Corporation of South Shields. This Bill contained an objectionable feature which occurs in a few other Local Authority Bills before Parliament during the present Session.

Although the financial provisions of the Bill are necessarily complicated, it may be said in short that if Parliament had sanctioned the Bill in its original form the Corporation would have been entitled to build up a Reserve Fund in respect of its Electricity Department out of the General Fund of the rates. The purposes of this Reserve Fund were to carry out capital works such as improvements and extensions of the Electricity Undertaking.

The South Shields Gas Company, which is among the largest ratepayers of the area, naturally objected to provisions which would enable the Corporation to carry out such capital works from the rates regardless of whether the Electricity Undertaking was being run at a profit or at a loss.

Mr. Askew, who appeared for the Company, argued the case at length before the Committee, and stated that the general principle as to whether trading departments should be maintained from their own resources or subsidized from the rates was at issue. He pointed out that the Gas Company, as large ratepayers, obviously objected to pay, through the rates, for the support of its principal commercial competitor.

After careful consideration the Committee stated that they upheld the principle that trading departments should be self-supporting, and that an amendment on the lines of that for which the Gas Company had petitioned must be incorporated in the Bill.

The South Shields Gas Company has done a great service to the Industry by contesting this matter, and in view of its success it is unlikely that any other Local Authority Bill in the original South Shields form will be promoted.

Bristol's Fine New Premises

THE magnificent new showrooms and offices of the Bristol Gas Company, whose official opening last Friday forms the subject of an illustrated article on later pages of this issue, provide an outstanding example of the Gas Industry's policy of moving abreast of the times in every phase of its widespread activities. There are those who assert that adequate technical and commercial efficiency alone will suffice; but the experience of recent years has brought home to the far-seeing boards and committees who manage the affairs of our progressive gas undertakings the necessity also of the appeal to the eye—not only in the appliances themselves, but also in the premises in which they are displayed. It has been realized that no matter how beautiful a fire or how efficient and attractive a cooker, it will not create the same appeal if displayed in a commonplace setting or a dingy back-street showroom as in up-to-date and pleasing surroundings.

The action of the Bristol Directors in the present instance is all the more praiseworthy when it is appreciated that the premises which they supersede were only built as recently as twenty years ago. Even comparatively modern equipment must be scrapped if present-day developments call for something newer. There is no need for us to dwell here upon the striking appearance of the new premises at Bristol, the pleasing details, or the attractive materials used in the interior decorations. It is sufficient to say that they fully conform to the very latest ideals of both design and construction; they form part of an effort which exists in many quarters to-day to make the gas undertaking's premises the centre of public attention and the popular rendezvous of the residents of a town—not just now and again when some special demonstration is being held, but throughout the year. The Bristol Company are deserving of congratulations upon their enlightened policy and the people of Bristol on the possession of a building which must constitute one of the finest of its kind in the country and of which they and the Gas Industry may justifiably feel proud.

Radiation Limited

IT is very generally agreed that in the partnership between gas manufacture and supply on the one hand, and plant and appliances making on the other, the Gas Industry has been very happily served throughout its long life. The Annual General Meeting of Radiation Ltd. held last week and reported in later columns of this issue, with the speech of the Chairman, Mr. H. James Yates, emphasizes this once again, and offers an opportunity to congratulate him and the Directors upon the excellent results they have achieved for the Industry, as well as their shareholders. There is something of the stability of the Gas Industry reflected in the success year after year of the big Radiation group—a success which stands out prominently above the inglorious careers of so many other trade amalgamations which rose and fell with the boom immediately following the war years. So that in its commercial success alone, in its contacts with the City as a big public Company, and with the public as shareholders, it is a very large asset to the Gas Industry.

We are pleased, however, that in his speech this year Mr. Yates gave such prominence to research. Not so long ago we had occasion in these notes to cross swords with Sir Harry McGowan, Chairman of I.C.I., on a statement of his that cookery has not yet been seriously con-

sidered from the engineering point of view. We maintained that the strictly engineering features of the modern gas cooker has brought better meals to millions of tables, that the gas oven thermostat was definitely an excellent example of precision engineering work, and that the public—and the Gas Industry—owed much to the fact that Radiation Ltd., in revolutionizing cooker design and performance, began at the right end of the stick by studying the science of cookery.

All these points, and many others besides, were admirably summarized in Mr. Yates' speech, and the Gas Industry owes it to the position and standing of Radiation that they reach a very wide and influential public. The Industry, as we have stressed on many occasions, owes much of its present prosperity to the makers of plant and appliances. It will wish that all of them may have favourable results in which shareholders, like those of Radiation Ltd., may participate.

The Ideal Fuel

THIS issue of the "JOURNAL" contains illustrated reviews of two London Exhibitions both of which provide fine examples of the progress of the Gas Industry to-day. The Silver Jubilee year of Their Majesties' reign has provided a splendid opportunity for staging a show at the *Daily Mail* Ideal Home Exhibition on a more ambitious and comprehensive scale than ever before, and the Gas Industry has not failed to play a prominent rôle in this demonstration of progress. In the absence of a Joint Gas Section at the British Industries Fair at Birmingham, the unofficial Gas Industry group display at Olympia, where the London Gas Exhibit Committee are supported by a large number of the leading appliance manufacturers, must be the most extensive demonstration to the public of what we have to offer for the modern "Ideal" home. It certainly indicates the Industry's response to the demand for colour in the home. There is a wealth of colour in the gas exhibits, and the new "Jubilee Blue" finish has been incorporated in many instances. Also, many exhibitors have taken the opportunity of introducing to the public new and improved apparatus.

The King's House is, of course, a centre of interest, and in this gas and coke play a prominent part. Here no form of propaganda is permitted. The Gas Light and Coke Company, however, have done a valuable service by setting up a special display of all the gas and coke equipment installed in the boiler room of the House, while a most attractive illustrated brochure has also been published by the British Commercial Gas Association describing the various appliances. Valuable publicity is also obtained for the Industry in many of the model houses, in which gas apparatus has been incorporated for various purposes, and a number of model kitchens to the design of well-known experts include as a matter of course gas appliances of the latest types—effective demonstration of the reliance placed in gas for providing the essential services in the home of to-day.

The other exhibition which we review to-day is the London Baking Trade Exhibition, held at the new Royal Horticultural Hall, Westminster. Here the Gas Light and Coke Company, in co-operation with several prominent firms of oven manufacturers, arranged a fine display, indicating to what extent and to what good purpose gas is employed in the bakery field. It is significant that gas was employed for the Students' National Bread-Baking Championship Competition.

The Old Firm

THIS title has no reference to the fact, of which we are credibly informed, that flat racing began last week, nor to the lamentable downfall, of which we learn by hearsay, of the Grand National favourite. It seems to us, rather, an apt opening to a few lines on the recent public appearance of Cannon Iron Foundries, Ltd.

Many, like ourselves, will have read with pleasure in the prospectus, offering preference and ordinary shares to the public, the report in which the present Managing Director, Mr. R. Talbot Clayton, stated that "the business was founded in 1826 by my Great-Grandfather, Edward Sheldon, and has been under the control of my family ever since." We in the "JOURNAL" only naturally have respect for the family tradition, but a glance at the report of any considerable gathering of the Gas Industry of years ago clearly indicates that many of the leaders of to-day are directly descended from its grand old men.

Even though we learn from the prospectus that Cannons began the manufacture of gas stoves only as comparatively recently as 40 years ago, their progressive spirit is well exemplified in the products they offer to the Industry, and it is not surprising that the bulk of their turnover now consists of gas appliances. In the conversion of the business into a public company one might have regretted the passing out of the family interest, as one is bound to regret the diminution of the local interest factor in the gas undertaking grouping movement. It is good to learn, therefore, that "continuity of management has been provided for by service agreements with all the Directors of the Vendor Company."

Very Brave New Britain

FROM a "feature" article which he contributed to the March 26 issue of the *Evening Standard*—which, although a London newspaper, is widely read far beyond the Metropolis—we gather that A. P. Luscombe Whyte is not a little fond of electricity. The young are forging plans for a Brave New Britain, but "they will plan in vain unless that New Britain be an all-electric Britain—clean, healthy, light, efficient. The people must become electrically-minded." The stranglehold on progress, he goes on, is the prices which the public have to pay for current. Being informed by experts that a unit of electricity can be generated, transmitted, and distributed for ½d. or less, Mr. Whyte sees no justification for the high prices which the public have to pay. "The electrical supply industry must be roused. It must sell cheaper." Otherwise electricity will remain the luxury it is at present.

In spite of the "experts," we have yet to learn that a unit of electricity can be supplied to the consumer for any and every purpose at ½d. or less unless a stream of credit from an outside source pours into the coffers of the electrical industry; and we note the protests of many chairmen of electricity companies against the fact that last year the price per unit at which they could buy from the Central Electricity Board showed a substantial rise. It must be obvious to others less well informed than Mr. Whyte that electric current supplied free, or at practically no cost, would be welcomed by the New Britain. So would free beer—and, quite incidentally, free gas, coke, and oil. But incidentals to life, such as gas, somehow are passed over. This is because the hysterical cry for more electricity is news value to the lay Press; the reasoned statement for the greater use of gas is not considered of reader interest. The fact remains, however, that gas is destined to play a fa

greater part than electricity in securing a clean, healthy, light, efficient Britain.

We advise the electrical industry to scrap its "antiquated systems" in the light of Mr. Whyte's stirring article, and then, after a little time, to balance its accounts without praying for outside aid. The electricity consumer will be very pleased indeed. We can well imagine the contented smile of the farmer as he rubs his hands (for warmth) before his electric fire. The electrical shareholder, too, will count himself a lucky man. In the meantime we ask that something more should be done to secure for gas the publicity which its services to the Nation so richly deserve.

Number, Please

It is common in athletics and other forms of sport for the competitors or players to wear numbers so that they may be identified on reference to the programme. This practice is satisfactory and sensible. The recently inaugurated Coke Salesmen's Circle has reversed this plan, and employs numbers so that its members cannot in any way be identified. The chairman at any meeting, however, is allowed to use his surname and initials, which is illogical. He ought to wear the stripes of a sergeant, or some such symbol of office. Then, in our report of the meeting we should have the delightful variation: "On the invitation of ⩛, No. 1 opened the discussion on the Paper by No. 99."

We suppose that the idea of this move is to encourage shy members of the Circle who are afraid to associate expressions of opinion with their own names to join in the discussion to the greater benefit of this numerical gathering. Or is it to suppress those who seize every opportunity of repeating at length what they have said before on many occasions? We suggest that if No. 2—who shall be nameless—has a tendency to be garrulous, then No. 2 will be heard just as much as if he were called by some such fancy name as "Fairy." That is, of course, if he continues to frequent the meetings of this particular ⊙.

Moreover, the thought occurs to us that the members of the Circle may be acquainted with one another, and may even know which member is employed by what undertaking. For this reason we put forward the suggestion that adequately to avoid identification the members should adopt different disguises at different meetings, the chairman alone having the privilege of wearing a mask. The expressions of opinion of No. 3 with a false nose might then be taken at their face value, while the remarks of bearded No. 5 would carry their full weight.

All things considered, we think that, on the Command 1, the Coke Salesmen's Circle would be well advised to dismiss the numerical method and encourage its members to come into the open prepared to face criticism. The alternative is for its meetings to be held *in camera*, in which case numbering-off becomes meaningless.

Personal

Mr. C. G. Broome, of the Industrial and Research Department of the Sheffield Gas Company, has been appointed Industrial Gas Salesman to the Spenborough U.D.C. Gas Department.

* * *

Mr. Ernest Parry, Commercial Manager of the Oldham Corporation Gas Department, has just completed 40 years' service with the Department. At last week's meeting of the Gas Committee, Mr. Parry was congratulated by the Chairman and other members of the Committee.

* * *

Mr. Louis W. Harrison, M.Inst.Gas E., son of Mr. R. E. Harrison, Secretary and Manager of Worsborough Dale Gas Company, has been appointed Assistant Engineer and Manager to the Barnsley Gas Company, on whose staff he has been for 12 years past.

* * *

After serving the Accrington and District Gas Board for 41 years as a collector and distributing some 820,000 accounts on their behalf, Mr. James Darbyshire, of Burnley Road, Huncoat, has retired. Mr. Darbyshire is a very familiar figure, and is one of two remaining employees of the old Accrington Gas Company.

* * *

At a meeting on March 29 of the Board of Directors of the Plymouth and Stonehouse Gas Light and Coke Company, Mr. R. B. Johns, J.P., was elected Deputy-Chairman of the Company, that office having been rendered vacant by the death of the late Mr. J. H. Ellis. The Secretary of the Company, Mr. G. H. Bolton, while still retaining that office, has also been elected to a seat on the Board.

* * *

Southport Corporation Gas Committee have appointed Mr. R. D. Groom, of Colchester, Manager of their Eastbank Street Showrooms.

Obituary

The death has occurred, at the age of 101, of Mrs. Margaret Dallas. She was the mother of Mr. W. Dallas, Secretary of the Broadstairs Gas Company, and until within a few weeks of her decease had led an active life. Born at Glamis, Forfarshire, she had resided in England for over seventy years.

Forthcoming Engagements

April.

4.—B.C.G.A.—Eastern District Meeting, Peterborough.
4.—Midland Junior Association.—Meeting and Paper by Mr. Leonard Bott.
5.—North British Association.—Spring Meeting at Dunfermline.
5.—B.C.G.A.—Annual Meeting of Gas Salesmen's Circles, Caxton Hall, S.W. 1.
6.—Manchester and District Junior Association.—Annual Meeting at Manchester. Paper by Mr. H. Partington and Dinner at 5.30 p.m.
8.—Gas Companies' Protection Association.—Committee Meeting at 5, Victoria Street, S.W., 2.30 p.m.
8.—I.G.E.—Finance Sub-Committee, 1.45 p.m.; Membership Sub-Committee, 2.30 p.m.; General Purposes Committee, 3.15 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.
9.—I.G.E.—Council Meeting, 10 a.m.; Education Committee, 4 p.m.
9.—National Gas Council.—Meeting of the Central Executive Board, 2.30 p.m.
9.—Federation of Gas Employers.—Meeting of the Central Committee, 4 p.m.
10.—I.G.E.—Education Executive Committee, 10 a.m.
11.—S.B.G.I.—Council Meeting, 2.30 p.m.
12.—Southern Association (Western District).—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m.
13.—Midland Junior Association.—Visit to Coombs Wood Works of Stewarts & Lloyds, Ltd., and the Halesowen Gas-Works.
13.—Scottish Junior Association (Eastern District).—Visit to Kirkcaldy. Paper by Mr J. M. Dow.
13.—Yorkshire Junior Association.—Meeting at Bradford. Paper by Dr. H. A. Fells.
26.—I.G.E.—Liquor Effluents and Ammonia Committee, 11 a.m.; Joint Research Committee, 2.30 p.m.
27.—I.G.E.—Examinations in Gas Engineering.

May.

3.—North of England Association.—Annual Meeting. Paper by Mr. T. P. Ridley.
3.—Wales and Mon. Junior Gas Association.—Annual General Meeting at Cardiff, 6.45 p.m.
4.—I.G.E.—Examinations in Gas Supply.

News in Brief

A Contribution to the Rates of £700 is to be made by the Newry Gas Committee. Last year's allocation to the same object was £500.

Change of Address.—The Coal Research Syndicate, Ltd., inform us that their offices are now at Westminster Bank Buildings, 1A, Grosvenor Gardens, S.W. 1. Telephone: Victoria 1868.

To Popularize Coke Fires, Leeds Corporation Gas Committee has decided to issue free small paper bag samples of coke to occupiers of houses fitted with fire-grates suitable for the purpose.

Free Floodlighting of the war memorial and other public buildings in Accrington, Church, Clayton-le-Moors, Great Harwood, and Rishton during Jubilee week is being provided by the Accrington District Gas Board.

Two Exhibitions are being held by the Newton-on-Ayr Gas Company, Ltd. The first is now running in Prestwick and will be open until April 5. The second will take place in the Foresters' Hall, Newton-on-Ayr, from April 8 to 12.

The Wainfleet (Lincs.) Gas-Works, in voluntary liquidation, will be sold by auction "as a going concern" at the Woolpack Hotel, Wainfleet, on April 12. Particulars may be had from the Auctioneers, John Willson & Sons, Burgh-le-Marsh, Lincs.

An Exhibition and Demonstrations of cookery and household washing are being held by the Manchester Gas Department at Withington Town Hall. At each session Mr. T. Bowen Partington delivers a talk on "Health and how it can be assured by using Gas."

Applications are Invited for the position of Secretary and Manager of the commercial side of the Berwick and Tweedmouth Gaslight Company, Ltd. The post carries a salary of £300 per annum. Further particulars will be found in the advertisement columns of this issue.

Owing to the Very Large Increase in gas consumption in the City of Elgin during the past few years, the Town Council have decided to extend the existing vertical retort bench which was built by Messrs. Woodall Duckham & Co., Ltd. It is hoped to complete the work this year.

A Special Committee has been formed to consider a proposal by the Stretford Gas Board to erect a gasholder in Glebelands Road, Ashton-on-Mersey. The increased demand for gas consequent upon the development of Sale has made it imperative that storage should be provided in the district.

By a Majority of Nine Votes Glasgow Corporation Gas Committee has decided to advertise for sale the Maclaurin Gas Plant at Dalmarnock Gas-Works, installed in 1925 at a cost of £46,000. The plant has not been in operation for over two years. It is stated that during five years £38,000 was lost in working the plant.

Owing to the Development of Maindee both as a residential area and a shopping centre, the Newport (Mon.) Gas Company have taken over premises which they have converted into temporary showrooms. An attractive lighting scheme complete with outside lamps has been arranged, and cookery demonstrations are being held twice daily.

Increased Storage is to be provided by the Newton Gas and Coke Company, Ltd., at Newton Abbot, who have placed an order with Messrs. Firth Blakeley, Sons, & Co., Ltd., of Church Fenton, Leeds, for a 3-lift spiral-guided gasholder and steel tank of 400,000 c.ft. capacity. The holder is to be equipped with "Vulcan" ball thrust carriages.

Society of Chemical Industry.—We have received from the Chemical Engineering Group of the Society a copy of their Proceedings for 1933 (Vol. XV.). The price of the volume is 10s. 6d. Delay in its publication has been due to the long and severe illness of the Hon. Editor, Prof. S. G. M. Ure; and we understand that the Proceedings for the year ended Dec. 31, 1934, will be issued shortly.

A Statement Showing the Oncost of the Undertaking compared with the collecting of revenue is being prepared by the Town Chamberlain on the instructions of the Johnstone Gas Committee. This comparative statement will show the income received from slot meters as compared with the ordinary meters and the cost of each as well as the time spent on repairing slot meters and the cost involved. The Committee will consider later the difference in oncost between automatic meters and slot meters.

A Correction.—The period during which Appeals against Reports of official Gas Examiners may be lodged is *twenty-one* days (not seven days as stated on p. 750 of last week's "JOURNAL"). The period of Appeal *was* seven days under the Gas Regulation Act, 1920, but the 1929 Act provided for its extension to twenty-one days. The Appeal period has not been modified by the 1934 Act, and it remains therefore at twenty-one days.

Very Satisfactory Results were produced by the exhibition and cookery demonstrations recently held by the Camborne Gas Company in conjunction with the Parkinson Stove Company, Ltd. An interesting display of a wide range of Parkinson modern gas appliances was on view and Miss H. Crawford-Fox, M.A.C., A.T.C.L., of the Parkinson Stove Company, Ltd., gave interesting lectures on gas cooking. The Lecture Hall was packed to capacity at each Lecture.

West of Scotland Gas Grid.—At a meeting of the Glasgow Gas Committee on March 29 a report was received from Sir Arthur Rose, Commissioner for Special Areas in Scotland, regarding the proposed gas grid for the West of Scotland. In view of the length of the report it was decided to circulate copies of it among the members and discuss it at the next meeting when a notice of motion will be given that the Committee consider the possible effect of a grid on the Corporation's Gas Undertakings. A plan was also submitted to the Committee showing the location of coke oven gas furnaces and private and municipal gas undertakings in the West of Scotland.

Popularity of Gas in Edinburgh.—At a recent meeting of the Public Utilities Committee of the Edinburgh Town Council, Mr. James Jamieson, Engineer and Manager of the Gas Department, submitted a report regarding the gas consumption which shows that for the month ended Feb. 15 the gas sold was 395,249,000 c.ft., representing an increase of 6,387,000 c.ft., or 1·64%, over last year's figures. In view of the mild weather these figures were considered extremely satisfactory, particularly since they were on the top of a substantial increase the previous year. Mr. Jamieson also reported that the number of appliances fitted during the month broke all previous records.

At the Recent Cookery Demonstrations held by the City of Coventry Gas Department a cake baking competition was arranged for adults and juniors, and nine of the entries were received from boys. The first prize was won by a boy of ten years old. As these demonstrations were carried out on Radiation "New World" cookers, this result proves the simplicity of cooking by these stoves—so simple, in fact, that a child of ten can enter a cake which has been perfectly cooked. Several classes of children and their teachers from the adjacent cookery schools attended the lectures, and showed a special interest in the cooking of a complete dinner in the "New World" oven without attention.

Film Link-Up at Birkenhead.—Birkenhead Corporation Gas Department co-operated with the management of the Scala Cinema, Birkenhead, in connection with the publicity campaign for the film "His Greatest Gamble." Inside the lobby of the theatre was a display of gas appliances, including stoves, hot water apparatus, refrigerators, &c., a setting being arranged showing a man cooking his breakfast on the stove. In close proximity to the display was a card with the wording "Gas will turn his Greatest Gamble into success, the fuel that never fails—but don't fail to see Richard Dix in 'His Greatest Gamble.'" The Gas Department also arranged a special display in their showroom windows.

1935 "JOURNAL" DIRECTORY

Page 4. ASHBOURNE. H. G. Harrison, E., M., & S., deceased.

Page 40. LICHFIELD. F. G. Mantle appointed M. & S.

Page 44. MATLOCK. G. R. Donaldson appointed M. vice T. Brown, retired. Undertaking acquired by Sheffield Gas Company.

Page 121. CORNISH SALESMEN'S CIRCLE. E. S. Buckley, of the Camborne Gas Company, elected Hon. Secretary vice R. Morton.

Page 121. SOUTHERN DISTRICT (KENT AREA) SALESMEN'S CIRCLE. Hon. Secretary, J. W. Harrison, Deal and Walmer Gas Company, Cannon Street, Deal, vice R. C. Bergg.

Evening Star Ladies' Night

An enjoyable and successful Ladies' Festival of the Evening Star Lodge, No. 1,719, was held on March 15 in the King Edward VII. suite of the Hotel Victoria, London. The Worshipful Master, W. Bro. W. F. Broadberry, and Mrs. Broadberry received the brethren and their guests.

The Companions of the Evening Star Chapter, of which Ex. Comp. Robert J. Meiklejohn is the First Principal and who attended with Mrs. Meiklejohn, were invited to take part, and many of them did so with their friends, masonic and otherwise.

After dinner there was an excellent concert and cabaret followed by a dance, the whole of the proceedings being heartily enjoyed by everyone present. The success of the function was due in large measure to the untiring efforts of W. Bro. A. L. Croager, who was responsible for its organization, assisted by the Festival Committee.

Co-operation of Scientific Societies

The first concrete step towards the establishment of a House of Science in London has been taken by the three principal chemists' organizations, the Society of Chemical Industry, Chemical Society, and Institute of Chemistry, for a draft agreement for co-operation in administration has already been drawn up and appears in the March 22 issue of *Chemistry and Industry* (the Journal of the Society of Chemical Industry).

During the last 16 years there have been spasmodic efforts to bring about this co-operation, and Mr. Edwin Thompson, President of the Society of Chemical Industry, at a recent dinner in Birmingham when urging the need for Great Britain to follow the example of France in the construction of a Chemistry House, even went so far as to suggest the use of the site of Burlington House for the purpose.

The publication of this agreement for the united administration of three important societies, representing some 14,000 scientists, marks the first definite stage of progress in the movement which has as its goal a scientific headquarters in London.

Social and Athletic

Messrs. W. H. Dean & Son, Burnley.

Almost 500 employees of Messrs. W. H. Dean & Son, Gas Washing Machine manufacturers, Victoria Works, Burnley, went to Birmingham to watch the cup-tie match with Burnley. The trip was made possible through the generosity of the Directors, who chartered a special train, meals being taken *en route*.

Gas Undertakings' Small Bore Rifle League.

The Hon. Secretary of the Gas Undertakings' Small Bore Rifle League sends us, from Bankside Works, Hull, the following League Table for the season 1934-1935.

Highest average score was obtained by Mr. L. Harvey, of Beckton "A," with 99·0 points.

Team.	Shot.	Won.	Lost.	Drawn.	Points.	Aggregate
Hull "A"	14	13	1	..	26	8 218
Beckton "A"	14	13	1	..	26	8.164
Portsmouth	14	10	4	..	20	8,193
Tottenham	14	7	7	..	14	7,989
Beckton "B"	14	6	8	..	12	7 035
Cambridge	14	3	11	..	6	7.902
Harrogas	14	3	11	..	6	7,875
Hull "B"	14	1	13	..	2	7 071

Wolverhampton Staff Whist Drive and Dance.

The Staff of the Wolverhampton Gas Company held their first Whist Drive and Dance at the Star and Garter Royal Hotel, Wolverhampton, on Monday, March 25.

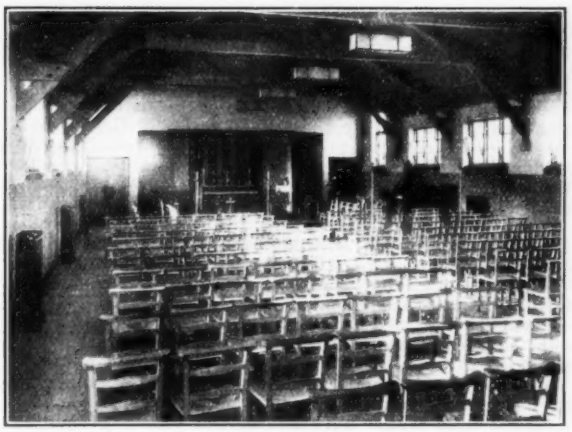
Everyone present seemed bent on having a good time, and, capably assisted by one of Wolverhampton's best Dance Bands, Leader Reg. Bartlan, himself a member of the Staff of the Gas Company, the 130 people present spent a most enjoyable evening.

There were about 50 Whist players, including several old members of the Staff who have retired on pension, and the prizes were presented by Miss Taylor, the only lady member of the Staff. The attendance included Mr. A. G. Williams (Commercial Manager and Secretary), Mr. W. Macnaughton (Deputy Engineer), Mr. W. Wilberforce (Fittings Superintendent), Mr. H. J. Reynolds (Chief Chemist), Mr. E. L. Wallis (Works Superintendent), and Mr. W. T. Hobson (Chief Draughtsman). Mr. A. H. Cranmer (Chief Engineer) was unavoidably absent.

The organizers of the event were Messrs. W. Macnaughton, H. J. Reynolds, E. L. Wallis, and W. T. Hobson.

Gas Ousts Electricity at Sheffield

The cost of heating St. Christopher's Mission Church, Bellhouse Road, Sheffield, has been reduced by almost two-thirds since the substitution of gas steam radiators for a very unsatisfactory and expensive system of electric tubular heaters which was installed in October, 1933. Early in October, 1934, the assistance of the Sheffield Gas Company was requested, with the result that twelve gas steam radiators were fitted to the exclusion of the tubular heaters.



Showing the new Gas Steam Radiators at St. Christopher's Mission Church, Sheffield.

The General Manager and Secretary of the Sheffield Gas Company, Mr. Ralph Halkett, has kindly forwarded us the following information which is taken from an original testimonial in his possession:

Comparative Costs—Gas and Electric Heating.

ST. CHRISTOPHER'S MISSION CHURCH, BELLHOUSE ROAD, SHEFFIELD.

	£	s.	d.
With Electricity (Tubular Heating)—			
This method originally installed and used from Oct. 26, 1933, until Jan. 29, 1934.			
Total consumption, 14,162 units of electricity at ½d. per unit	29	10	1
With Gas (Steam Radiators)—			
Twelve radiators installed and used from Oct. 26, 1934, until Jan. 28, 1935.			
Total consumption of gas, 73,200 c.ft. at 2s. 9d. per 1,000 c.ft.	10	1	4
Gross saving in heating costs over same period	£19	8	9

The floor area of the church is 64 ft. by 32 ft., with seating accommodation for 420 persons. Since the installation of gas last October there has been a 50% improvement in the heating of the edifice.

Koppers Coke Oven Company, Ltd.

Another Medium-Temperature Installation.

The Barsinghausen Colliery, near Hanover, belonging to the German State, is undertaking an extensive reconstruction programme with a view to improving its working results, which have for some time been unremunerative. The basis of the improvement is carbonization and it is intended to carbonize the coal produced from this mine and to convert it into a high-grade product suitable for the domestic market and for burning either in closed stoves or in open grates.

After a careful examination of other types of carbonizing plant the Company have now placed a contract for a battery of Koppers medium-temperature coke ovens consisting of 29 Koppers combination circulation ovens operating at medium temperature and carbonizing 350 tons of coal (dry basis) per 24 hours.

The ovens are remarkable in that they will have an average width of only 8½ in., and they are 12 ft. in height and 36 ft. in length.

The coal will be cleaned by means of the Sophia-Jacoba Specific Gravity Process, and is then suitably prepared for carbonization in a plant provided by the Koppers Com-

pany, who have also obtained the order for the complete by-product recovery plant.

This important order also includes the whole of the coal and coke handling plant, with coke quenching installation and coke screening and breaking plant. A high yield of motor fuel is expected, together with a valuable quantity of surplus gas of high calorific value. This is the seventh order for a medium-temperature plant received by the Koppers Companies within the last four years.

Research on Coke

Extracts from the 1934 Report of the Midland Coke Research Committee

The Midland Coke Research Committee, which was formed in 1926, is financed by grants from the producers and users of blast furnace coke made in the Midland area, supplemented by a grant from the Department of Scientific and Industrial Research which is administered by the Industrial Research Council of the British Iron and Steel Federation.

The experimental work of the Committee is carried out under the direction of Prof. R. V. Wheeler in the Department of Fuel Technology of Sheffield University, and at neighbouring coke oven and blast furnace plants.

The staff, under the supervision of R. A. Mott, M.Sc., F.I.C., was: Senior Assistant, J. Hiles, M.Sc.; Assistants, D. F. Marshall, Ph.D., B.Sc.Tech (during the second half of the year), W. Brewin, J. Hodgkinson, and F. Frith.

The Committee's experimental oven, erected at a local coke oven plant, enables cokes to be made under conditions almost identical with those of large-scale practice. The oven is 3 ft. high, 3 ft. long, and 18 in. wide, and takes 500-lb. charges of coal. The charge can be carbonized in from 12 to 26 hours, the normal period being 18 hours so as to compare with modern coking practice. Preliminary tests have been made to amplify, on a larger scale, the laboratory tests which have shown the benefit of adding oil to some coking coals.

Low volatile Welsh coking and non-coking coals were added to Yorkshire coking coals. The effect of the addition of non-coking coals was most marked, a 10% addition increasing the 1½-in. shatter index from 80 to 89. An important observation is that the further addition of coke dust increased the 1½-in. shatter index to 93, the effect of the two additions being cumulative.

The Sheffield Laboratory Coking Test, in which 6 gm. of finely crushed coal are heated in a narrow silica tube, fitted with a plunger, at a rate of temperature rise of 1° C. per min. over a range of approximately 300°-450° C., has proved satisfactory for measuring the swelling power of coal; the swelling power is the most useful laboratory measure for the value of a coal for coke making. The standard test has been simplified by the substitution of a steel tube and plunger for the silica ware, thus considerably reducing the cost of the apparatus.

Previous work has established the increase in swelling power of poorly coking coals by adding oils (such as crude tar) in small quantities. Since the uniform admixture of a dry powder, such as ground pitch, would be simpler in practice than oil additions, the effect of adding powdered pitch in varying amounts has been studied.

In many Yorkshire coking slacks, up to 30% of durain may be present. The durain accumulates in coarser sizes of the crushed slack and appears to be responsible for the production of abradable coke when the coking coal is of low rank. Tests made to determine the effect of the size of the durain suggested that its adverse influence was reduced by fine crushing. Other tests have shown that the amount of durain which can be present in coking slack, without disadvantage to the quality of the coke, varies with the rank of the coking coal, being the least for coals of low rank.

Blends of finely ground bright coal and durain heated in the Sheffield Laboratory Coking Test show progressive reduction of swelling power with increased percentages of durain. This test may therefore be used with advantage to determine the influence of durain.

Combustion of Coke.

In a slow-combustion stove, or a domestic grate, coke is required to burn at a low rate, and on occasion to keep alight for periods when the temperature is not much higher than the ignition temperature. The laboratory test devised by the Northern Coke Research Committee (Combustibility Test No. 3) has been found to be a good guide to the probable behaviour of lump coke burnt under these conditions, and a modification of this test has been used. It has been found that the results are only significant if the intensity (and not the time) of ignition given to the coke is standardized. Coke of 10-20 mesh in a bed 1½ in. in diameter in a silica tube is ignited by means of a heating coil and a downward current of air until the zone of ignition has spread to the sides of the tube. The current is then cut off and the rate of air supply (critical air blast) required to maintain combustion during 20 minutes is determined. This test appears to measure the "reactivity" of coke to air at low temperatures of combustion.

Many tests have been made with cokes of different screen size and "critical air blast" in a barred coke grate. A linear relationship between the "reactivity" and the time for coke of 1-1½-in. size to attain a bright fire has been traced, "reactive" cokes giving a hot fire sooner. Moreover, "unreactive" cokes (critical air blast exceeding 0·055) cannot be used successfully of 1½-2-in. size. Once ignited, "unreactive" cokes can provide good radiation, and the problem of using such cokes satisfactorily is essentially to accelerate their rate of combustion. Means of doing this are being studied.

Cox Ovenbuilders, Ltd.

A New Company

The old-established firm of Cox & Son, Bakery Engineers, of Tyseley, Birmingham, has now been formed into a Limited Company and will in future trade under the name of Cox Ovenbuilders, Ltd. The Directors of the Company are: Messrs. J. Blatch Cox, H. A. Cruxton, and A. H. Warriner, F.C.A. The registered offices are at 121, King's Road, Tyseley, Birmingham, 11.

The capital of the Company is £10,000 and the objects are to adopt an agreement with J. Blatch Cox, and to carry on the business of oven builders, bakery engineers, &c.

Messrs. Cox & Son claim to be the pioneers of gas-fired ovens of the Peel type, for this kind of oven was invented by the founder of the firm—the late J. Blatch Cox, a patent being granted to him in 1879. Various other patents have been granted to the firm between 1879 and 1935, and over 40 years' experience in bakery engineering has made the Cox ovens famous throughout the country for economy and efficiency.

Milk Sterilization by Gas

Liverpool Exhibition

The Liverpool Gas Development Centre put to good purpose the movement among local authorities of tightening up the regulation relative to sterilization of milk bottles. The Centre, representative of 19 gas undertakings in the district, arranged an exhibition to show dairymen why gas should be used in lieu of solid fuel for the raising of steam.

Apart from other considerations, with the solid fuel-fired boiler the process of sterilization and of pasteurization could not be worked to timetable. The Centre converted several boilers to gas-firing by the installation of suitable burners below the boiler in order to overcome some of these difficulties. They also designed a self-contained chest in which steam was generated within the cabinet. This chest was very compact, rapid in action, and was so clean in operation that it could be installed within the dairy itself.

Since then, considerable progress has been made in the design of sterilizing units, many well-known dairy appliance manufacturers now supplying gas-heated outfits. In some of these, in addition to supplying steam for sterilization, the boiler may be used for providing hot water for washing purposes. In some outfits the bottles and utensils are rendered perfectly dry, and glassware appears bright and polished. For the pasteurization of milk, steam-jacketed gas-fired pans are now on the market. The appliance is fitted with control devices which automatically cut down the gas supply when the necessary pressure or the required temperature has been attained.

The objects of the exhibition, which was staged in the Industrial Showrooms of the Liverpool Gas Company, were to enable members of the staffs of subscribing undertakings to become familiar with the uses of gas in the dairy trade and to show dairymen in the areas of subscribers how gas could be used with advantage in their business. Many of the members of the Centre used this exhibition as an opportunity for circularizing their local dairymen, and so popular was the demonstration that its period was extended for a further week until March 22.

Several examples of what could be done by way of conversion from coal to gas were shown at the exhibition, in addition to many gas-heated units supplied by well-known dairy appliance manufacturers. Automatic heat regulators are a valuable feature of many of the outfits.

On the question of cost, the Liverpool Gas Company quotes a special price for gas consumed in high-pressure steam boilers at 4½d. per therm, *plus* a small quarterly standing charge, as compared with the usual charge of 7·4d. per therm.

Fine New Showrooms and Offices at Bristol

An impression of the imposing front of the Bristol Company's New Premises.

Official Opening

An outstanding example of modern gas showroom practice is provided in the magnificent new premises of the Bristol Gas Company, which were officially inaugurated last Friday in the presence of a large and distinguished gathering.

The Bristol Gas Company decided in 1932 to make alterations to their Chief Offices and Showrooms to meet the need for additional accommodation for their expanding business. At that time the premises consisted of an office building—one room of which was set apart as a Showroom. This building, well known to all Bristolians, was erected in 1907 and its clock tower has long been a feature of the Tramways Centre. Behind this building was a collection of smaller additions that had been made from time to time until the whole site had been covered.

The reconstruction of the building was undertaken in three sections, so that the Company could remain in possession while the work was in progress. The section in Trenchard Street was commenced first. This building contains the Mains Department and a Conference Room, with lavatories for the Staff. The construction is simple, and the finishings are suitable for office buildings. Care has been taken to plan the rooms to suit the furniture, with good light on both sides and cross ventilation.

The second section to be completed contains the Rental Hall, Collectors' Rooms, and Inspectors' Offices. These form a large block immediately behind the existing building in Pipe Lane. Windows are obtained on both sides of the offices. The Rental Hall is 20 ft. high in order to obtain windows above the adjoining roofs. The variation in floor levels has required careful planning of staircases, so that all departments may be reached with convenience.

The Rental Hall is panelled in oak and Australian black bean to the general line of the screens and fittings. This gives a permanent protection to the walls, and greatly improves the proportion of the room which is seen from the public space.

The counter is in Australian walnut with a front of Travertine marble in three colours of brown, cream, and yellow.

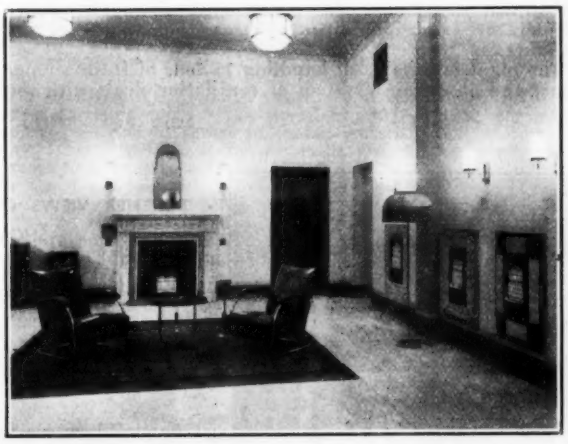
The third section, the front portion of the building facing Colston Street, is constructed as a steel framed building, which permits of the modern treatment that has been adopted for the elevation. The construction is clearly expressed in the design, instead of being concealed in the lines of the finished building as is so often the case. Portland stone has been used for the front, with granite round the door and plinth. Stancheons are cased with concrete finished with grey and yellow tiles.

The large lettering for the Company's name is designed to be seen from across the Tramway Centre. Two tall flag poles are provided for decoration on state occasions.

The new building has a frontage of approximately 100 ft. and a depth of approximately 180 ft. The front is constructed of selected Portland stone, while the side walls are built of Bath stone. The name of the Company at the top of the building is composed of letters 3 ft. high, made of lead covered metal cellulosed, inlaid with Staybrite strips, and floodlighted at night by 5 gas flood lamps.

The two Showroom windows are each 20 ft. long and 7 ft. 6 in. deep, and are semi-enclosed. The frames are of bronze metal, while the lettering above the windows is also in bronze and is illuminated from behind the letters.

The ground and lower floors of the frontage are constructed for Showrooms, while the first floor is utilized for the Board Room and Committee Room. The second floor contains the staff dining room, service room, and staff recreation rooms, and the third floor is used for the kitchen and service rooms. The flat roofs are laid in squares of concrete, and are designed for recreation purposes.



A Section of the Gas Fire Display.

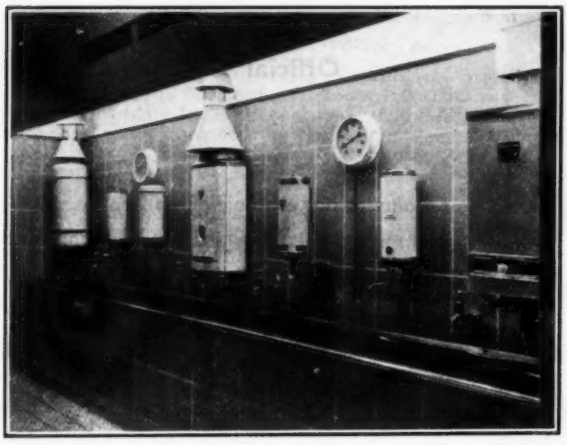
Although the building extends from Colston Street to Trenchard Street at the rear in an almost continuous series of rooms, there is ample light in all parts.

The interiors of the buildings are light and cheerful, reliance being placed on good materials and clean bright

colours, rather than on decorative features as such. The sense of space and freedom, the study of form and line, and simple direct planning has produced a building that reflects the change of modern life in its desire for essentials.

Heating and Ventilation.

In addition to gas fires, the general heating is by means of a low-pressure hot water installation, supplied by a cast-iron sectional coke boiler. Duplicate accelerating pumps circulate the water, working alternate weeks, and



A Fine Water Heating Exhibit.

pumping over 6,000 gallons of water per hour round the system.

The latest type of column radiator is provided for the majority of the rooms, but the Board and other principal rooms are warmed by flat wall panels. Where possible fresh air is introduced behind both types of heating surface, and is thus warmed before passing into the room.

Welding has been extensively used in fixing the pipe runs, especially where the latter are concealed in the fabric of the building. The above apparatus also supplies the necessary heat to the air-warming batteries of the ventilating plant.

Full regard has been paid to the comfort of the public visiting this building. The atmospheric conditions are efficiently dealt with by an air-conditioning installation. Fresh air is drawn from outside and passed through an air washing chamber, where it is cleaned and humidified. Incorporated in this is an automatic control which maintains the relative humidity of the air in the building at a comfortable condition. From this chamber the air passes through a centrifugal fan and heater to a system of trunking which distributes the conditioned air at a proper temperature and humidity to the various parts of the building.

The plant is capable of handling 14 tons of fresh air per hour, and an exhaust system of ventilation deals with the vitiated air which is collected at high level in the room, and discharged to atmosphere by means of centrifugal fans.

The Showrooms.

To the general public the Showrooms are the main features of the building. In achieving their object of providing better facilities for displaying their goods the Bristol Gas Company have given the City a permanent exhibition of gas apparatus.

Passing beneath the portcullis gate guarding the main entrance the visitor is at once impressed with the beautiful colourings of the marble and tiles forming the entrance hall. Smart pageboys open the doors which give access to the lounge showroom. The walls of this room are in plain plaster, finished a cream colour, with ceilings of light green. The columns are in terra-cotta shade of red, with green and gold caps. The floor is of Travertine marble. Comfortable settees and chairs tempt one to stop and admire the handsome lighting fittings, the Adams Fireplace, or the beautiful panel fires and enamel cookers which surround the walls. At one end of this room two steps lead to the lift and staircase. The main saloon is reached by passing through the lounge. The walls of this room are panelled in oak and walnut veneers to give a more intimate character to the exhibits, which are mainly gas fires. The floor, like the lounge, is of Travertine marble.

The note of variety is obtained by giving individuality to the various exhibits, and a great number of different and attractive settings have been devised.

The bathroom display, leading off this room, with its glass walls, marble and tile floor, coloured baths and wash basins, supplied with hot water from chromium geysers, will appeal to all visitors. Beyond the main saloon and entered through it is the Rental Hall for the payment of accounts, dealing with inquiries, &c. The public space in front of the counter is arranged under a series of plaster domes with centre lights, and with a floor of Travertine marble. The lower showrooms are reached by the lift or staircase from the lounge.

The area at the foot of the staircase is complete with an illuminated fountain.

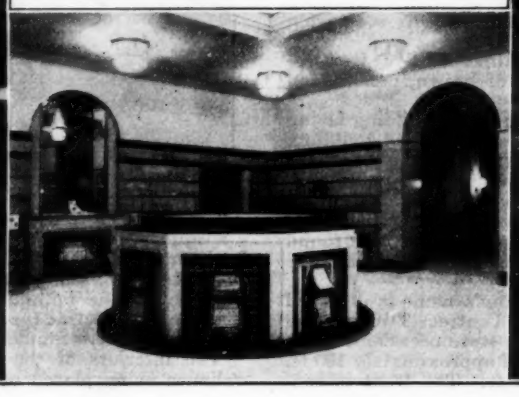
The exhibits in these rooms are arranged in a series of tiled recesses with concealed lighting behind glass soffits, the effect being to concentrate the light on the appliances. The principle is the same as in the lighting of a modern aquarium. The floors are of Terrazzo, laid out in squares. The first of these rooms displays hotel equipment and coke fires. The second consists of all types of water heaters, enamelled cookers, refrigerators, and gas fires. All the exhibits are working. The water heating displays, with heat indicators showing the temperatures of the water, are particularly impressive. The third showroom is of special interest to builders and shows the method of building in flue blocks in lieu of chimneys. This is also the room where one can choose the colour scheme of a new gas fire.

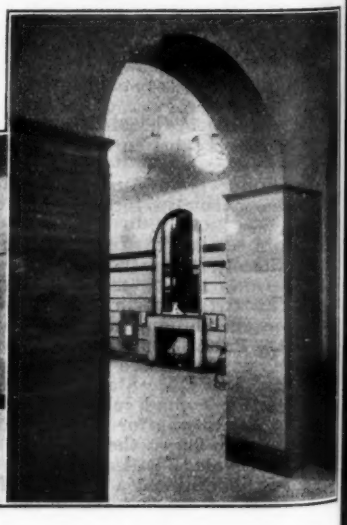
The many uses of gas are further displayed in the engine room, where three engines looking like motor lorry engines, but driven by gas, show how gas can generate electricity.

The towers carried up on each side of the building are also to be floodlighted at night.

The Architect for the building was Mr. Austen Hall, of London, Architect to the British Commercial Gas Associa-

FURTHER VIEWS OF BRISTOL'S NEW GAS SHOWROOMS.





tion; and the Contractors were Messrs. Wm. Cowlin & Sons, of Bristol.

INAUGURAL LUNCHEON.

Many leading representatives of the Gas Industry, as well as prominent local citizens, including the Lord Mayor and Sheriff of Bristol, attended a luncheon given by the Bristol Gas Company to celebrate the opening of the new Chief Offices and Showrooms.

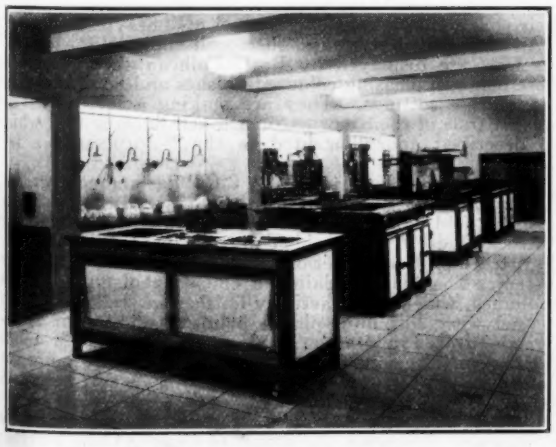
Proposing "The City and County of Bristol," Councillor WALTER MUTER, Convener of the Edinburgh Corporation Gas Committee, and President of the British Commercial Gas Association, said he considered it a very high honour that he should have been asked to undertake that very important toast. "The inaguration of these wonderful showrooms and offices," he said, "is perhaps an example of what Bristol can do. I would like to assure you, my Lord Mayor, not only on behalf of the British Commercial Gas Association, but as a Councillor of Edinburgh, that we share with you your admiration for this great town of the West."

The LORD MAYOR, Alderman H. J. Maggs, in reply, said he shared Councillor Muter's feeling that it was a great day for the Bristol Gas Company and also for the city they were so proud of.

Mr. ROBERT BERNAYS, who is National Liberal M.P. for North Bristol, proposed "The Gas Industry." "Those of us who know nothing about gas," he said, "know it is having a growing importance in our national economy. The Industry uses 17,000,000 tons of coal, which, after all, is our nation's greatest asset. That is good news to us in Bristol, which depends so much on the prosperity of South Wales. It is playing a big part in the struggle to achieve smoke abatement, and gives employment to 115,000 men in this country; while there are in the Gas Industry most ideal relations between capital and labour. Gas, too, is transforming the homes of our people. Gas fires, cookers, and water heaters are playing a tremendous part in removing the drudgery of housework, and I look forward to the time—and I represent a poor part of this great city—when every one of my constituents will be able to have those labour-saving devices of the kind I saw in your showrooms this afternoon. I rejoice that the Gas Industry is leading the way to a healthier and happier England. I am delighted that Bristol has such a flourishing Gas Industry. May I congratulate you, too, on the building you have erected to house it. I cannot say more than that this building is worthy to take its place with all the landmarks of our lovely city."

Sir FRANCIS GOODENOUGH, C.B.E., Executive Chairman of the British Commercial Gas Association, responded, and thanked Mr. Bernays for all the kind things he had said. He went on to pay honour to the city and its very live Gas Undertaking. The Bristol Gas Company gave an example to the rest of the Industry in progressive spirit and enterprise.

"The Gas Industry," he said, "was never more alive than it is to-day. There was never such prospect of service to the public in the home, factory, and places of business as at the present time. The progress of the Industry in utility and popularity in recent years has been a great surprise to those who would have liked to witness its supersession, but not to those of us who are aware of its tremendous possibilities of public service as the most scientific method of making available to



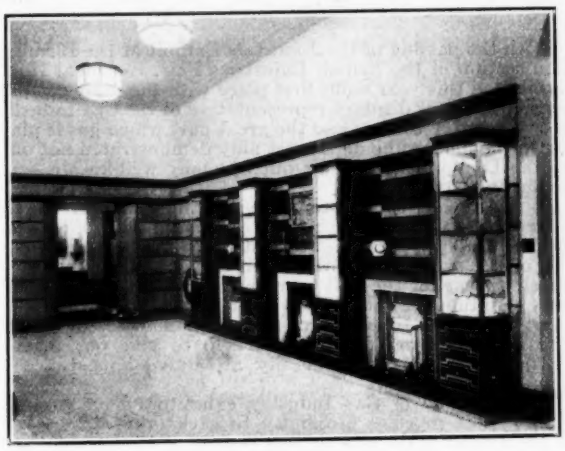
Large-Scale Cooking Apparatus.

the citizens of this country the latent heat of the coalfields. After 50 years in the Industry my faith in its progress and power is as great as ever. The Bristol Gas Company has given us a fine practical example to prove they share my faith in the future of gas. They are prepared to give the public of Bristol even finer service than they have done hitherto—and that means a very great deal. We in the Gas Industry regard Bristol as one of our leading undertakings, a real shining light, and I am very glad to be here to pay tribute to it to-day."

A Progressive Undertaking.

Mr. C. VALON BENNETT, President of The Institution of Gas Engineers, also replied, thanking the proposer for coupling his name, as a representative of The Institution, with the toast. "Those of us who, with our forebears, have been connected "will always couple the name of the Bristol Gas Company with progress, efficiency, and success.

"I have travelled here from Rochester not to make a long speech, but to see the beautiful showrooms and offices; and if I may, sir, I should like to congratulate you upon this your latest enterprise. The Institution of Gas Engineers has always had the very highest regard for the Bristol Gas Company, its Directors, and its officials. We recognize that the Bristol Gas



Another Corner of the Showroom.

Company has not only done its best to serve the area which has been allotted to it by Act of Parliament, but has ever done its best to make manifest to the whole of the country the uses of gas—and for that we are undoubtedly very grateful.

"We as The Institution remember that in 1905 your then Engineer, the late Mr. Daniel Irving, was our President. I can remember many Presidents before 1905, but it was in that year that I first attended the annual meeting of The Institution, and I can still visualize the late Mr. Irving. I remember what satisfaction he gave to the members of the Institution on that occasion.

"Your present Chief Engineer, Mr. Robertson, is in the very front rank of his profession, and I can truthfully say for him, as serving his second period on the Council of The Institution, that whatever remarks he has to make, whatever criticisms he may offer, or suggestions he may bring forward, they are listened to with the greatest amount of respect.

"With regard to Mr. Halliwell, he is a tower of strength to the Gas Industry. He is connected with many national organizations, and I should like to express on behalf of The Institution and other national organizations the thanks to him for all the interest he has taken. [Applause.]

"If good wishes and thanks for past services will ensure success, then so far as The Institution of Gas Engineers is concerned I am sure you have a very rosy future."

Alderman JOHN H. INSKIP, Chairman of the Bristol Electricity Committee, toasted "The Bristol Gas Company."

Mr. GEORGE H. BOUCHER, Chairman of the Bristol Gas Company, in reply, said: "The Board of my Company very much appreciates several things in connection with this function to-day. One is that so many people have come considerable distances to honour us with their presence and show their interest in the Undertaking. Secondly, I want to thank Alderman Inskip very much for being good enough, as my competitor and rival, to come here and show his goodwill and that of the Corporation towards this Undertaking by proposing the toast of 'The Bristol Gas Company.' We have to thank sincerely the architect, Mr. Austen Hall, for the premises, and also to thank the contractors for the way the building has been erected. When I tell you we have rebuilt the front and back of the buildings and been able to carry on business the whole of that time except for the showrooms, which have been temporarily put elsewhere, it shows what a great amount of credit is to be given to the architect and contractors for the way they have worked."

The CHAIRMAN then proposed the toast of "The Architect and Contractors," coupling with it the name of Mr. Austen Hall.

Mr. H. AUSTEN HALL, replying, said how happy his connection with the Board had been during the three years in which he had been concerned with the new buildings. "I have," he said, "been Consulting Architect to the British Commercial Gas Association since its foundation in 1911, but it has taken 20 years for the Association as a whole to realize it had a Consulting Architect, and until the last few years I have not had anything to do. That has enabled me to collect ideas. You see the result to-day, and I am very glad they have been received so kindly.

Mr. Hall expressed his indebtedness to the Directors for their sympathy and help, and to the contractors, Messrs. William Cowlin & Son.

OUTSTANDING GAS DISPLAYS AT
The Ideal Home Exhibition

The wealth of pageantry and progress during the eventful 25 years of the King's reign form the brilliant theme of the nineteenth *Daily Mail* Ideal Home Exhibition which opened at Olympia on March 26 and continues until April 18. Gas plays a more prominent part than ever before.

With the passing of the Joint Gas Exhibit at the Birmingham section of the British Industries Fair, the Ideal Home Exhibition this year holds first place with the most comprehensive series of displays representative of the Gas Industry in this country to-day; and the great part which gas is playing in the modern home is most ably demonstrated not only by the London Gas Exhibit but by many well-known firms in the Industry.

In our review of the stands, which must of necessity be somewhat inadequate by reason of the number and extent of the displays, we have attempted to give a general survey of the exhibits, together with details of any apparatus which appear for the first time or are of particular interest, for exhibitions of this nature frequently provide an opportunity for firms to introduce new appliances to the public. The accompanying photographs help to give our readers an impression of the generally attractive appearance of many of the stands.

The majority of Gas Industry exhibitors have grouped their stands in close proximity to each other at one end of the Grand Hall, and in this respect a very comprehensive "Gas Section" has been formed which should be of considerable publicity value to the Industry. Gas has a showing, however, in many other parts of the exhibition in one capacity or another.

The London Gas Exhibit.

The stand of the London Gas Exhibit Committee is again the joint effort of the Croydon Gas Company, the Gas Light and Coke Company, the Tottenham and District Gas Company, and the Wandsworth and District Gas Company, and comprises a very comprehensive display of domestic gas apparatus, particular attention being paid to colour and also to the adaptability of gas for the small portable appliance. A large "gadget table," attractively illuminated and bound in shining chromium plating, occupies the centre of the interior of the stand, and here all the latest small gas appliances which can be plugged in to gas are displayed. In addition to attractive cooking and water heating sections, a special point is made of gas-operated refrigerators, a striking display being arranged on the side of the stand facing upon the main gangway. Here the new "Freezolux" air-cooled "L.J.K." model by Electrolux, Ltd., is shown for the first time. This model has a storage capacity of approximately 4 c.ft. and a shelf area of 7·5 sq. ft.

A Striking Display of "Portcullis" Fires.

A wide range of gas fires by many prominent makers are displayed, a feature being the new Jubilee Blue in which several models are finished. Mention should also be made of the very attractive lighting fittings in chromium-plated finish.

The King's House.

On the first floor of the Empire Hall the Gas Light and Coke Company have arranged a display of all the equipment for central heating and water heating fitted in the boiler room of the King's House. A gravity feed coke boiler is being used for centrally heating the house. This boiler is regulated from the living room. An automatically controlled coke boiler has been chosen for water heating as well. Two gas-fired boilers have been fitted to take charge of water heating during the summer. All these boilers are enclosed in steel jackets, finished in Jubilee blue enamel, while the doors are in black enamel with chromium-plated fittings.

There is no need for us to refer again to the gas equipment in the King's House, a list of which was given in a recent issue of the "JOURNAL." We should, however, mention the very attractive brochure published by the British Commercial Gas Association, which is available on the gas stand. This booklet, in a cover of Jubilee blue, describes and illustrates all the gas and coke equipment with full acknowledgments to the respective makers of all the appliances. This is particularly useful, by reason of the fact that no makers' names have been permitted to appear on any of the equipment in the King's House, as a result of which we understand that at least one national daily has already eulogized upon the "beautiful electric cooker" in the kitchen. What the Parkinson Stove Company think of this description of a development of their very attractive gas cooker which we described and illustrated in the "JOURNAL" for Jan. 23 last we do not know; but, in any case, it is poor propaganda for the Industry.

To deal now with the other gas and allied products displays in alphabetical order, we come to the stand of Ascot Gas Water Heaters, Ltd., who are demonstrating working models of their multi-point and sink gas water heaters. In conjunction with their display the firm have organized an interesting painting competition for children, for which they are offering attractive prizes. This stand is also effectively lighted by gas.

Benham & Sons, Ltd., who are makers of large-scale cooking apparatus, are showing a representative display of their sink combinations constructed of "Staybrite" steel.

An attractive selection of their well-known "Portcullis" gas fires are displayed by Bratt Colbran, Ltd., many of these being in pleasing coloured finishes and beautiful wood and marble settings. They are making a feature at the present time of their new automatic self-lighting tap, which we described and illustrated in the "JOURNAL" a few weeks ago.

In addition to their range of "C.C." gas and coke grates, J. Brockhouse & Co., Ltd., have now entered the gas water heating field, and are showing for the first time their "Brock-House" unit, which may be used independently or fitted up in conjunction with the existing hot water system. The makers claim an efficiency of 80% for this appliance, which is attractively finished in cream porcelain enamel with chromium-plated fittings. The unit is designed to feed a storage tank not exceeding 25 to 30 gallons capacity, and it is stated to have a maximum gas consumption of 24 c.ft. per hour, raising in this period 18 gallons of water to 100° F.

Examples of their boilers, radiators, and malleable fittings are shown on the stand of Crane, Ltd., together with a selection of their cast iron and gunmetal valves.

The Eagle Range and Grate Company, Ltd. (Radiation, Ltd.), are exhibiting a representative display of "Eagle" ranges and combination grates for all requirements, including the "New Eagle" coke range, a new departure in cooking apparatus. This comprehensive display is completed by the "New Eagle" gas-ignited coke grate. Special attention is called to the coloured porcelain enamel finishes noted for their pleasing appearance, hard wearing qualities, and ease of cleaning.

Electrolux, Ltd., are showing a fine range of gas oper-

ated refrigerators of all sizes, including the new air-cooled "L.J.K." model, to which we have just referred in connection with the London Gas Exhibit.

A feature of the display of Ewart & Son, Ltd., is their very attractive bathroom suites in various colours, with which they have harmonized the finishes of a number of their gas water heaters. The new "Califont de Luxe" multi-point heater is shown, together with others of their well-known instantaneous heaters in pleasing coloured finishes, and also a gas-heated towel rail. This firm are also showing a gas copper which is particularly suitable

A Fine Display by Radiation, Ltd.

for smaller property in that it is designed to provide hot water on the syphon principle for the bath.

Cookery demonstrations on their new "de Luxe" model "Kabineat" cooker are a feature of the stand of Sidney Flavel & Co., Ltd. The chief advantage of this new model is the improved self-locking plate rack. Another new appliance is their "Jubilee" cooker, which has several points of interest, including a folding-down back panel and plate rack to form an enamel table top. A further cooker by this firm has been developed specially for small kitchens where space is at a premium. This model has no protruding hotplate cornices and will thus fit conveniently between other kitchen equipment. A new panel gas fire is also of interest. This has folding doors hinged at the top and bottom of the fire, which when opened assist in reflecting the heat of the fire outwards from their polished steel backs. In addition to an example of the "Metro" gas log fire, the firm's latest, "Il-Co-Rad" heaters which we described and illustrated in last week's "JOURNAL," are prominently displayed, as also are examples of their "Paradise" griller. There is also a Flavel cooker in the "Easiwork" country house kitchen.

Some beautiful examples of glassware, including some particularly intended for gas lighting, are displayed on the stand of Hailwood & Ackroyd, Ltd.

Coke Equipment.

A comprehensive array of coke appliances and radiators are displayed by Ideal Boilers and Radiators, Ltd., who also show their "Ideal Cookanheat" combined gas and coke appliances for cooking and water heating.

Another stand devoted to coke appliances is that of the London and Counties Coke Association, who show many examples of domestic boilers and open grates which have been tested and approved by the Association. The wide range of attractive coloured finishes in which the hitherto rather dull coke boiler may be obtained is particularly notable. The Association also emphasize on their stand the controllability of coke, and show an example of the automatic control mechanism on the latest type of domestic boiler. This is fitted with two thermostats—on the boiler and in the keyroom—and the motor which operates the dampers incorporates a safety device in the event of current failure. Examples of specially graded cokes are shown, while to indicate the cleanliness of the coke fire a glass section is let into the flue from one of the open grates.

The first thing which strikes one on seeing the stand of R. & A. Main, Ltd., is the particularly pleasing and harmonious colour scheme. Indeed, there is a general atmosphere of colour and brightness about the whole display. A new model in their series of "Sussex" cookers, fitted with the Main's gas match, is prominent, while a feature is also made of portable gas fires, a number of which are shown in a wide range of attractive colours—some in dual finish. A new instantaneous water heater—the "Presto"—is designed for sink or hand basin, and, in several pleasing coloured enamel finishes, it incorporates an ingenious safety device operated on the bi-metal strip principle. Examples of the G.L.C. geyser in coloured finishes and combining the governor and automatic valve are also shown, together with some very pleasing standard and bracket lighting fittings. Cookery demonstrations also add interest to this display.

Hot Water Supply.

Many examples of instantaneous and storage water heaters in pleasing finishes are shown by New Geysers, Ltd., including their "Autofont" multi-point apparatus which is very neat in appearance, while a further colourful display of gas water heaters is to be seen on the stand of the Pollard Engineering Company, Ltd.

A cascade of water at over 140° F., similar to that adopted on the Gas Exhibit at the South London Exhibition, referred to recently in these columns, forms a striking centre-piece to the display of Thomas Potterton (Heating Engineers), Ltd. The hot water for this is provided by a Rex boiler. All that gas can do in the way of hot water supply and central heating for domestic and industrial purposes is ably demonstrated on this stand, there being examples of many of this firm's well-known plant, including the "Emperor" unit as installed in the King's House for hot water supply.

"Potatoes pay for careful cooking" is one of the slogans of the Potato Marketing Board, whose demonstrations of the many appetizing ways of preparing potatoes for the table are attracting considerable public interest. Two lady demonstrators lent by the Gas Light and Coke Company assist the Board's own demonstrators in cooking the potatoes in a pleasing model kitchen, equipped with a "Calthorpe" gas cooker in white enamel finish throughout and a gas-operated refrigerator. These demonstrations are aimed at showing the public that potatoes, besides being an indispensable item of daily food, can also be prepared in numberless tasty ways, and a representative of the Board told us that cooking the potatoes by gas enabled the demonstrators to work to a better programme. They aimed in addition to provide a really attractive kitchen in which to carry out the demonstration, which would give housewives a better idea of how to plan their own kitchens.

Examples of their gas washing machines are to be seen on the stand of Press Caps, Ltd., whose apparatus is simple

A Gas Hot Water and Central Heating Exhibit.

to operate by the working of a handle backwards and forwards. Only soap and water are needed.

Radiation Display.

A very fine display of domestic gas appliances is staged by Radiation, Ltd., who are making a special feature of their self-lighting "High Beam" gas fires. The latest development of the Davis "Sunsquare" built-in fire is that the stainless steel frame is now symmetrical all round, giving a much improved appearance as compared with the earlier models with the deeper framing at the bottom. Radiation have set out to show in a novel way how well the modern gas fire will harmonize with any colour scheme. This has been achieved by setting the various models in different coloured glass tiled surrounds. These surrounds are particularly beautiful, and some of the individual tiles

incorporate attractive designs. Examples of the firm's water heaters and cookers are, of course, prominently displayed, a feature of the latter being the improved type of gas match fitted to many of the models.

An additional air of "life" is added to the display by the cookery demonstrations carried out by one of the firm's well-known experts, while Radiation, Ltd., are also to be congratulated on obtaining the services of a lady artist whose lightning crayon sketches of gas subjects treated in humorous vein are attracting considerable attention at the Exhibition, and whose ingenious work in this capacity has been of benefit elsewhere in the Industry for several years past.

Shown on the stand of R. Russell & Sons, Ltd., is their "New Herald" gas combination, in enamel finish, giving constant hot water, gas oven and fire, each separately controlled, but all contained in one compact unit. The oven and water supply are automatically controlled, and the combination is shown in various finishes.

The exhibit of the Vulcan Stove Company, Ltd., includes their well-known glass-fronted cooker oven, and also examples of their "Transit" portable gas fire, which is a neat little appliance with a gas consumption of 8 c.ft. per hour.

Gas in the Model Kitchens.

Among the model kitchens is one very attractive example which has been designed by Mrs. Darcy Braddell, and includes a Parkinson cooker of the type installed in the King's House, a Ewart "Califont de Luxe" water heater, and a built-in "Portcullis" gas fire.

Another model kitchen is that which won the first prize in the recent B.C.G.A. competition. This is creating a considerable amount of interest—and doubtless some criticism from those competitors who failed to figure in the prize list. The chief criticism levelled against it by the experts is that both the doors are facing the window. However, the wise positioning of the various appliances is very apparent.

A gas cooker plays its part alongside electricity and oil and other stoves in the "University of Cookery," where continuous demonstrations are carried on, while an Empire Timber "Staybrite" kitchen has been planned, in co-operation with the Government of British Columbia, to illustrate the possibilities of the alliance of timber and steel to form a very attractive modern gas kitchen.

Gas also figures largely in the *Women's Journal* House for all purposes except lighting, while other of the model homes feature gas to a lesser extent—mainly plug-in points for gas pokers. An interesting and valuable exhibit from the Industry's point of view, however, is the model kitchen designed as a suggestion for new house owners, shown on the stand of New Ideal Homesteads, Ltd., who claim to be one of Britain's biggest builders. Here are examples of gas cooker, circulator, and refrigerator.

A large number of other concerns use gas in one connection or another on their stands—mainly for cookery demonstrations—but enough has been said to indicate that gas has a truly magnificent showing at this year's Ideal Home Exhibition, and the various exhibiting firms are to be congratulated on putting up a show fully worthy of the great Industry they represent.

"Electricity Law and Practice"*

Reviewed by "Engineer"

The sub-title of this book adequately describes its scope, "A handbook on the application and effect of the Electricity Acts, 1882 to 1935."

The average official in an administrative position in the Gas Industry is not expected to be well versed in the legislative side of the electrical industry. It is often necessary to know the powers of one's competitor, particularly in respect to supplies to consumers, methods of charge, variations of tariff, and such like. There must be many cases of illegal methods of charge being enforced to the detriment of the older industry which go unchallenged because the gas official is not sure of his ground.

The legislation regarding electricity is complicated—more so than gas—and the co-ordination between the various Acts is not good; the correct interpretation of some of the statutes is still doubtful.

This book should give the gas man all he wants. The Author has made a highly successful effort to co-ordinate and summarize the existing statutes by dividing the subject matter under headings, and where necessary he has added notes and comments of practical value bearing on such matters.

There are four prominent features of this book:

1. The marginal notes.
2. Table of cases and statutes, and appendices of Acts and Regulations.
3. An appendix of definitions or interpretations.
4. An excellent index.

Not all the statutory provisions are quoted verbatim. The majority are paraphrased in short and simple language, and with the help of the marginal notes the reader can keep track of the relevant sections.

The book is well planned. Following the table of statutes, Chapters I. to VII. embrace a review of the constitution of the electricity supply industry as it exists to-day; these chapters include a survey of Legislation covering general and private Acts, the functions of the Minister of Transport, the Electricity Commissioners, Joint Authorities, and the Central Electricity Board. Power Companies are dealt with in Chapter VI. and other authorized undertakers in Chapter VII. The following Chapter deals with the limited monopoly enjoyed by an authorized undertaker, fringe Orders, and unauthorized undertakers, and Chapter X. touches upon bulk supplies and mutual assistance. Chapter IX. (Accounts and Audit) and Chapters XI. to XVII. cover the entire operating functions of a supply company, such as obligations in regard to supplies for public and private consumption, the powers and limitations in regard to methods of charge and tariffs, maintenance of pressure, use and inspection of meters, payments and recovery of charges, and disconnection. A special Chapter (XVI.) is devoted to the powers in respect of works, whether these works are on private lands or on the highway. It is interesting to note that no statutory power is necessary to legalize land for the generation of electricity. The construction of works, however, is subject to many technical provisions imposed by the Regulations of the Electricity Commissioners. Electric lines must be in accordance with the appropriate standard specification. Chapters XVIII. to XX. deal with breaking up of streets, use of lands and wayleaves over private land. The two following Chapters cover inquiries made by the Ministry of Transport, Electricity Commissioners, and the C.E. Board.

Purchase powers and transfers occupy the two following Chapters, and XXV. contains all the provisions as to employees; fittings and contracting are included, and Chapters XXVI. to XXIX. deal with penalties payable by undertakers, and by others, with a note as to criminal offences. Notices, special protective provisions, and stamp duties are covered by the last three chapters. In the table of statutes, all Acts and Orders having any bearing on Electrical Authorities are included.

It can be seen from this survey that no aspect of the subject has been overlooked.

The book should prove of the greatest value to those for whom it is written—viz., officials of electrical and other public utility undertakings, consumers, owners and occupiers of property, officials of Local Authorities, and members of the legal profession.

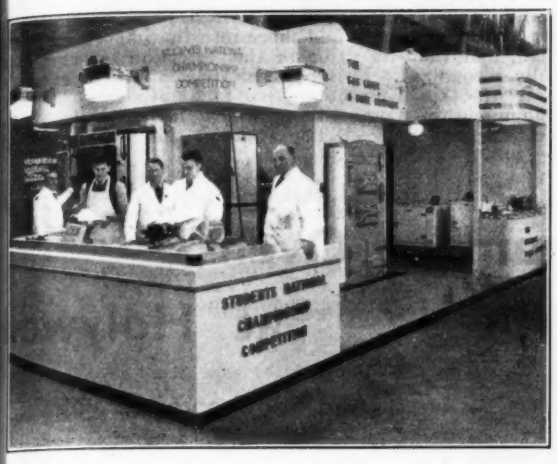
Those who come in contact with the supply of electricity in an administrative position cannot afford to be without it, while for the student it is equally necessary. The Reviewer, in congratulating the Author, can only echo the words of approval of the Attorney-General when he says in the foreword: "I have no doubt that this book will fulfil its purpose and will illuminate a great deal that at present is all obscure."

* "Electricity Law and Practice," by R. H. Studholme, M.A., with a Foreword by the Rt. Hon. Sir Thomas Inskip, C.B.E. Pitman. Price 30s. net.

A REVIEW OF GAS APPLIANCES

For the Bakery Trade

In our review of the Thirteenth London Baking Trade Exhibition, which was held at the New Royal Horticultural Hall, Westminster, from March 26 28, we have endeavoured to indicate the great service gas is rendering to the Bakery Trade.



A Corner of the Gas Light and Coke Company's Stand.

A striking display of ovens and accessories was arranged by the Gas Light and Coke Company, the whole stand being very attractively illuminated by Sugg's "Arcade" lamps.

Oven fronts representative of the plant of several well-known manufacturers were shown, including Cox & Son, of Tyseley, Birmingham; Dumbrill Plant and Engineering Company, of Beddington Lane, Croydon; Ellerstyle Engineering Company, Ltd., of Pentonville Road, N. 1; and Kent & Co. (Globe Works), Ltd., of Bow, E. 3.

Very high efficiency is claimed for the Cox "Super Heat Trap" gas oven, which is built in one, two, three, or four deck sizes, and is subject to very accurate temperature control. After the gas has been turned down, the oven can be worked for several hours on stored heat, and even after standing by for 24 hours the lost heat can be quickly regained. This oven is designed and constructed on thoroughly scientific lines, a steady heat being so distributed as to ensure perfect baking. The system is based on the laws of gravitation—hot air being lighter rises to the top while the cooler air falls. The act of driving on fresh heat to take the place of that being used expels the chilled products, so heating the oven to an even temperature throughout. The makers state that this oven is so constructed that the cost of "fuel" is only little more than that of equal heating by means of coke with all the advantages of the controllability and cleanliness of gas by way of compensation.

The Dumbrill "Supergas" steam tube oven is the result of several years' continuous experiment carried out by the firm's research engineers in close co-operation with large gas undertakings. This oven incorporates independent heat control for each deck, and when necessary only one deck need be fired. "Smalls" can be baked in one deck and bread in the other simultaneously.

Baking Demonstrations.

A wide range of baking equipment by Ellerstyle was shown not only by the Gas Light and Coke Company but also on the firm's own stand, on which baking demonstrations were carried out. This demonstration oven was the "Thermtrap" fitted with the "Thermspray" boiler to provide steam for Vienna and quality bread, and also with a gas light box, switch controlled, for illuminating the oven interior. This oven is neat, compact, and efficient, while the "Thermspray" incorporates an automatic regulator which controls the gas when steaming.

Appearance as well as eating qualities is necessary in bread baking. Not only Vienna bread and rolls and similar goods but most varieties of bread will create a demand if it has a good crust and appetizing appearance. Vienna bread and rolls are proved upside down to avoid any possibility of a skin forming on the upper part which is kept soft and pliable. Such care, however, would be wasted if the dough pieces were not set in an oven filled with wet steam. The wet steam condenses on the relatively cool dough, gelatinizing the starch cells on the surface of the dough. The action of dextrinization and saccharification of the starch is completed and it only remains for the bread to be finished with a dry oven (steam being allowed to escape through the damper about 10 minutes before drawing the batch) to secure the crisp crust.

To obtain satisfactory results it is important to employ steam of the correct quality. It is useless to inject dry steam. The "Thermspray" gas-fired boiler has been designed to generate steam carrying water vapour into the oven. It incorporates a new single control steam outlet providing simple manipulation and delivering sufficient steam to charge the largest ovens. An insulating jacket ensures a minimum of heat loss, and the "Thermspray" is very economical and when connected in the usual way to the warm water supply assuming a temperature of water at 120° F. is ready for use in about 10 minutes. The gas rate to maintain steaming at working pressure is about $\frac{1}{12}$th therm per hour. The maximum gas rate is $\frac{1}{4}$ therm per hour to raise cold water to 25 lbs. sq. in. working pressure.

Another Useful Oven.

The "Thermtrap Junior" gas-fired oven is another interesting apparatus by the same firm. This has steam-tight individual baking chambers, and no products of combustion come in contact with the articles being baked. Each deck is externally heated on top and bottom, and the special construction assures that the hot gases pass to the front of the oven before reaching the back, giving uniformity of heating. The lower deck is provided with a tiled sole, and is suitable for baking bread with or without tins.

A special heat control damper is fitted in the flue system, and the construction provides alternative top or bottom flue outlet. The burner units are of very efficient design, and all excess air is eliminated, the air inlet having a linked control with the gas cock. All air entering the burner is positively localized in the combustion zone of each burner unit thereby assuring good combustion. The burner jets are of the luminous type, and in consequence of secondary air only being required the regulation is positive and highly efficient.

Cox, Dumbrill, and Ellerstyle Ovens shown in the Gas Light and Coke Company's Exhibit.

Also shown on the Gas Light and Coke Company's stand was a gas-heated proving oven, with a "Thermidity" gas-fired steam boiler, which is capable of supplying six or eight ovens. An "Equator" storage water heater, a gas-operated refrigerator of the new large air-cooled type were

also shown, together with the Ellerstyle doughnut fryer which is particularly clean and efficient in operation.

On the Ellerstyle stand there was also to be seen a gas-heated water tempering and measuring tank to meet the need for a reliable supply of hot water for dough making. Thermostatic control cuts down the gas when the water reaches 120° F., and the apparatus is complete with thermometer, magnifying gauge glass, with reverse scale readings, and a lid to the tank for cleaning purposes.

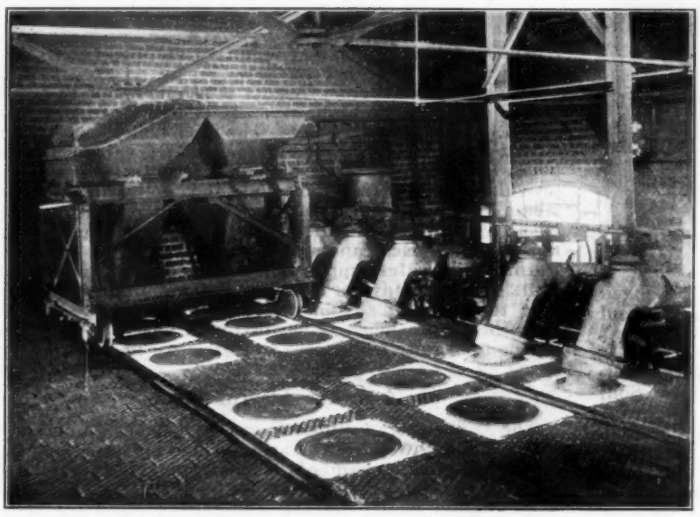
An example of the front of a Kent oven was shown on the Gas Company's stand, on which experiments are in progress for converting side flue coal-fired ovens in an efficient manner to gaseous firing. This firm were also showing one of their oven fronts on their own stand.

The Gas Light and Coke Company are to be congratulated upon organizing, with the co-operation of the firms mentioned, so comprehensive a display, which shows that gas is entering more and more into the important bakery field, and that its value in this direction is being more fully recognized. It is particularly gratifying, indeed, to note in this connection that the Students' National Championship Competition, which has hitherto always been conducted by electric ovens, is this year carried out by gas.

New Jenkins-Klonne Chamber Ovens at Holywell

And Showrooms at Flint

Tuesday, March 26, witnessed the combined inauguration at the Holywell Gas-Works of a new Jenkins-Klonne Chamber Oven Plant, and at Flint of new showroom premises, for the British Gas Light Company.



Top of bench of Holywell Chamber Oven plant, showing off-take pipes charging doors, and charging car.

Tuesday, March 26, was a memorable day in the history of the Holywell and Flint Undertakings of the British Gas Light Company, Ltd., when new plant erected at the Gas-Works at Greenfield, Holywell, was inaugurated, and new showrooms at Trelawny Square, Flint, were opened.

The Holywell Works was one of the first of the Company's stations, and in 1825 the Company commenced to supply gas in the townships of Holywell, Greenfield, and Bagillt, the works being at Greenfield. Although the Company received a petition requesting a supply of gas from the inhabitants of Flint in 1847, they could not comply with the request, with the result that a Company was formed in Flint to manufacture its own gas. However, in 1931, the British Gas Light Company purchased the Flint Undertaking, and it is interesting to note that gas was first supplied to Flint from Holywell in 1934—87 years after the original petition. After purchasing the Flint Undertaking the Company considered which of the two sites—Greenfield or Flint—was the more suitable for a manufacturing station, and the site at Greenfield was chosen. In 1933 a 6-in. steel main was continued through to Holywell from Flint and Bagillt.

At the Greenfield Works a new carbonizing plant, a new steam boiler, new exhausting machinery, and two compressors for pumping gas to Flint were installed. At Greenfield a new coke grading plant was installed, while extensive alterations to existing plant and Works mains, and to buildings, were carried out. In addition to this the Company purchased premises in Flint for showrooms.

In order to facilitate the distribution of gas now being made entirely at Holywell, two new gasholders, each of 100,000 c.ft. capacity and of identical design, have been erected by C. & W. Walker, Ltd., of Donnington, one at Holywell and the other at Flint. Gas from the new holder at Holywell can be pumped to Flint and Bagillt or supplied direct to the district at Holywell, as desired.

The new carbonizing plant consists of a bench of Jenkins-Klönne intermittent vertical chambers, erected by W. J. Jenkins & Co., Ltd., of Retford. These chambers, which are of rectangular section, are 13 ft. in height, 6·7 ft. in length, 12 in. in width, and take a charge of approximately 1·4 tons of coal each. They are arranged in three settings, one of three chambers and two of two chambers each, and provision has been made for the addition of more chambers when required. The nominal total output of the plant is 200,000 c.ft. of gas per day with all the chambers in action when the coal carbonized would be about 16 tons. While the installation at Holywell is intended primarily for use with North Wales coal, this type of plant has the advantage that it will deal with any class of coal.

In the new engine room there are two exhausters. One of these deals with 10,000 c.ft. of gas per hour and the other 15,000 c.ft. per hour. In the same room there are two rotary compressors for pumping the gas to Flint. These were manufactured by the Bryan Donkin Company, Ltd., and are capable of delivering gas at the rate of 20,000 c.ft. per hour against a pressure of 5 lbs. per sq. in.

The showrooms are situated in the centre of the town in Trelawny Square. The work has been carried out by the Nautilus Company, of Luton, to the design of their architect, Mr. W. F. Blagg.

Inauguration Ceremonies.

In the presence of the Company's Directors and members of the Holywell Urban Council and of the Flint Borough Council and officials, Captain James Ayer (Chairman of the Holywell Urban Council) set in motion the skip hoist of the new carbonizing plant. Mr. Henry Woodall, J.P. (Chairman of the Company), welcomed the members of both Flint and Holywell Councils and presented Captain Ayer with a silver cigarette box as a memento of the occasion.

Captain Ayer, in thanking Mr. Woodall and his Directors, said that Greenfield was now part of the Holywell Urban area, and he assured them that the Holywell Council was a progressive body, which greatly appreciated the progressiveness of a Company which catered for the needs of the public.

The next part of the programme was to see the Mayor of Flint (Alderman Frederick Bird Edwards, J.P., C.C.) starting up the compressor sending gas to Flint. The party was then conveyed in motor coaches to Flint, where in Trelawny Square extensive and modern showrooms and offices were opened by the Mayor of Flint, who complimented the Company upon their enterprise in providing a building that would enhance the value of Trelawny Square. The Mayor was then presented with an inscribed cigarette box as a souvenir of the occasion by Mr. Woodall, and the Councillors and officials proceeded to inspect the premises, and later sat down to luncheon at the Flint Town Hall, provided by the Company to celebrate the occasion.

The Mayor of Flint proposed the toast of "The British Gas Light Company," and paid a high tribute to the Company's Engineer and Manager, Mr. R. S. P. Prince.

Mr. Woodall responded to the toast.

A NEW METHOD FOR
Refining Benzole and Hydrocarbons

by

C. A. HAHN and HARALD NIELSEN

of the

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The heavy volumetric losses generally suffered in the refining of motor benzole by the application of sulphuric acid prompted the Authors to start a series of investigations regarding the behaviour of the unsaturated constituents of the crude benzole against a new refining agent. They hoped that a certain measure of success in this direction would throw some light on other equally, if not more, important subjects they are dealing with in the Laboratory.

One of our objects was to obtain a light and storage-stable benzole with the least possible loss of the valuable constituents, together with the most complete removal of the unwanted constituents liable to polymerization, &c.

This report, which, through the courtesy of the Editor of the "GAS JOURNAL," we put before British gas engineers, is of a self-contained investigation, but it is also a stepping stone to the closer study of a greater and more involved problem—namely, that of dealing with the gum in gas along lines which we believe are new.

Our work on the unsaturated hydrocarbons in crude benzole, particularly on those which slowly polymerize through the action of light, air, and time, and thereby form resinous, gummy constituents, has given us valuable indications regarding new lines of attack on the same bodies in the gas, for the ultimate purpose of the complete removals of these. We consider it is an easier matter to deal with these than to go on looking for the needle in the haystack—the oxygen carrying minute quantities of nitrogen oxides.

Experimental Section.

A sample of crude tar benzole boiling between 85° and 160° C. was subjected to a close examination in order to elucidate the following three questions:

I. What percentage of the unsaturated constituents will it be necessary to remove from the benzole in order to obtain an absolutely colourless, stable benzole which would not change on storing under conditions that would be classed as severe?

II. If, by refining by means of pre-selected strength of reagent only a certain proportion of the unsaturated constituents is removed, would this be caused by reaction fatigue of the reagent, or does it mean that a reagent of that particular selected strength is not able to carry the refining further on repeated treatment and to react with the balance of the unsaturated constituents?

III. What changes take place in the treated benzole in other respects?

With reference to Question I. a measure of the unsaturated constituents in a benzole is the iodine number. The higher the iodine number, the higher the percentage of the unsaturated in proportion to the stable hydrocarbons.

We describe in an appendix the method we employed for obtaining exact values of the iodine number.

It will be realized that, working on a laboratory scale, it is not possible to obtain accurate measures of refining losses, as these of necessity must be considerably larger than under actual works conditions. As a general rule, however, deducting bases and acidic bodies which have to be removed in any case, a fall in the iodine number gives a good indication, as a fall in this is proportional to the refining loss sustained. A drop of 1·0 in the iodine number will give a refining loss of about 0·8%, when the iodine number is ascertained on the basis of 100 c.c. of benzole. We found the loss due to the removal of the coumarone resins and allied bodies to be between 3 and 4%.

Examination and working-up of the benzole were carried out on lines as far as possible similar to those applicable to actual working practice, taking the much smaller quantities dealt with into consideration.

When we state that a benzole has been subjected to one treatment, the benzole has been through the following operations:

300 c.c. of benzole is shaken in a 500 c.c. separating funnel in three times 5 mins: with 2% by volume of reagent. After each shaking, the benzole is allowed to stand for 15 mins. The reagent and the resins are separated out, and a new charge of 2% by volume of reagent is added, and again shaken for three times 5 mins. After 15 mins., the reagent is separated from the benzole, the latter being repeatedly washed out with water, 50 c.c. at the time, until the separated water is quite clear. The water-washing is followed by a wash with 1% by volume of a NaOH solution of a specific gravity of 1·15 and intensive shaking for 5 mins.

When the precipitate and surplus alkali have separated out, water washes with the same quantities as above are carried out until the effluent water is neutral in reaction towards litmus.

In order to tabulate the results obtained, the various mixtures of reagent are divided into 10 classes of different strengths—*i.e.*, from 0 to 10—so that the figure 10 represents the strongest acting reagent.

As a preliminary proof of the completeness of the reaction, the samples were placed in clear glass bottles, after being distilled up to 155° C., for observation of any changes in colour due to exposure to direct sunlight.

In dealing with Question I., What percentage of the unsaturated constituents will it be necessary to remove from the benzole in order to obtain a colourless product? 9 samples of crude benzole were subjected *each to one treatment* as outlined above, 300 c.c. being taken each time with varying strength of reagent from 0 to 8. It was found unnecessary to go further than strength 8, as already the distilled product from the benzole treated with strength 4 was completely colourless and remained so.

TABLE No. I.

Benzole.	Iodine Number.	Colour, &c.
Crude benzole distilled up to 155° C.	24·4	Clear, yellow greenish
Benzole treated with—		
Reagent 0	24·0	,, faint yellow
,, 1	24·4	,, practically colourless
,, 2	23·4	,, ,, ,,
,, 3	23·1	,, colourless
,, 4	21·8	,, ,, refractive
,, 5	19·3	,, ,, strongly refractive
,, 6	15·9	,, ,, ,, ,,
,, 7	13·5	,, ,, ,, ,,
,, 8	11·8	,, ,, ,, ,,

In Table I. will be found the iodine numbers for the different benzole samples after treatment, as well as notes regarding the colour of the benzole distilled over.

The benzole treated with strength 4 was found to fulfil the stipulated conditions, and the fall in the iodine number was only 2·6. It was noticed that the benzole samples treated with strengths 0, 1, 2 were slightly discoloured, but, to our surprise, after a short exposure to direct sunlight the distillate became bleached to almost water-white colour. These samples, however, did not possess the beautiful light refraction characterizing the other samples.

It will thus be seen that *a relatively slight drop in the iodine number* does the trick, provided always that the right unsaturated bodies are attacked by the reagent.

The reply to Question II. regarding the reaction fatigue of the reagent demanded much work and time, and is therefore only carried out with refining strength of reagents which we considered generally useful for practical application—that is, from strength 2 to strength 8 inclusive. This range is wide and gives a good idea of the ability of the various reagents to carry out the refining to finality in each case.

The examination for the reaction of each strength of

reagent was carried out in the following way: 400 c.c. of tar benzole was subjected to one treatment as mentioned above with the strength of reagent under consideration, and the iodine number determined immediately after the treatment. A part of the treated benzole was subjected to a repeat treatment exactly as before, the iodine number again determined, and so on until no further fall in the iodine number took place. Finally the treated benzole was distilled up to 155° C. and the iodine number finally determined. The results of these protracted operations appear in Table II., and are shown graphically in fig. 1.

TABLE No. II.

Strength of Reagent Used.	Iodine Numbers. Numbers of Treatment. 1	2	3	4	5	Iodine Numbers. Fractions Up to 155° C.
Reagent 2	25·6	25·6				23·2
,, 3	24·8	23·4	22·5	22·2		20·0
,, 4	24·0	18·4	17·3	17·0		15·9
,, 5	22·1	15·9	14·1	13·6		12·2
,, 6	16·7	13·3	11·2	10·7	10·2	8·6
,, 7	15·3	10·3	8·4	7·3	7·0	5·1
,, 8	13·8	7·6	5·6	3·9	3·2	2·2

NOTE.—The iodine number of the crude benzole was . . . . 26·1
,, ,, ,, ,, crude distilled up to 155° C. was 24·4

As will be observed from the curves, the continued treatment of a benzole with one specific strength of reagent will carry the refining *to a specific limit characteristic for that particular reagent strength selected* and to a *definite iodine number*, which by repeated treatment with that strength of reagent *cannot be reduced further*. The reply to Question II. can be summarized thus:

By a definite strength of reagent the unsaturated constituents can only be attacked down to a definite limit, and the unsaturated constituents below this limit cannot react with that particular strength of reagent, and are therefore stable against that reagent.

We consider this observation, confirmed as it is by our experiments, to be one of fundamental importance, and one which in our opinion is conclusive for the general application of our method of refining.

Respecting Question III., as to changes in the benzole treated in other respects, we have for the work connected

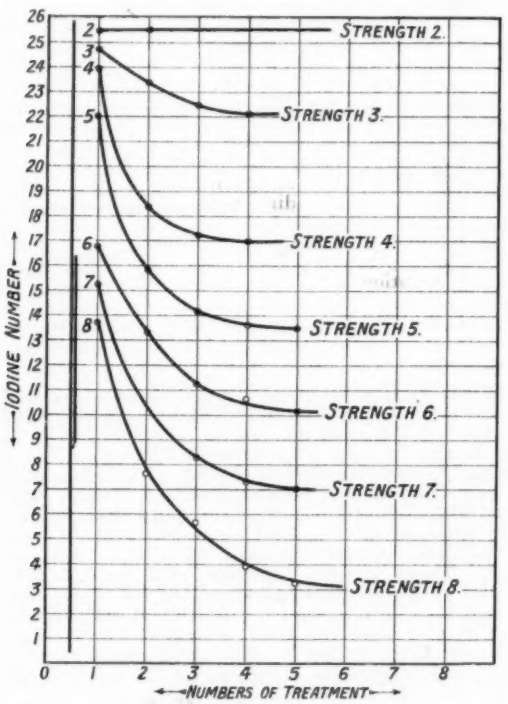


Fig. 1.

therewith utilized the benzole samples from the two previous lines of investigation.

The benzoles from the first series have been examined for sulphur content and for specific gravities, while the benzoles from the second are examined for specific gravities and Engler distillation curves.

A. Sulphur.—It is naturally of importance to remove by the refining the greatest possible quantity of sulphur. An examination as to the behaviour of the various strengths of reagent in this respect was therefore considered of interest. Regarding the method of analysis we employed we refer to Appendix I. Table III. gives the values

TABLE No. III.

Benzole.	Grams of Sulphur per 100 C.c. C_6H_6.
Crude benzole distilled up to 155° C.	0·387
After treatment with reagent strength 0	0·356
,, ,, ,, ,, 1	0·361
,, ,, ,, ,, 2	0·351
,, ,, ,, ,, 3	0·348
,, ,, ,, ,, 4	0·304
,, ,, ,, ,, 5	0·230
,, ,, ,, ,, 6	0·139
,, ,, ,, ,, 7	0·112

we found, and graphically they are shown in fig. 2. It will be observed that, by increasing strength of reagent, the percentage of sulphur decreases. We are of the opinion

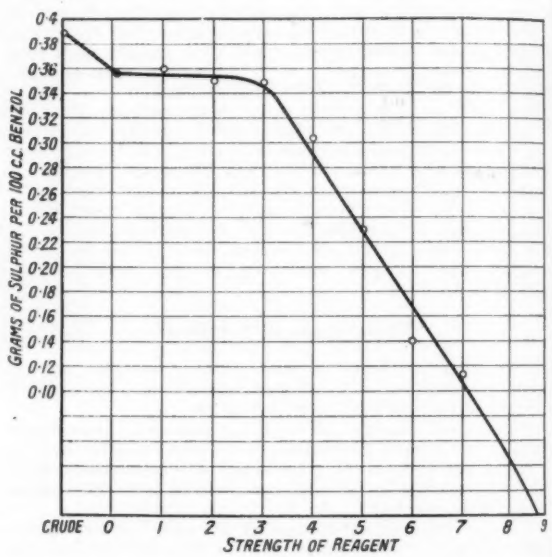


Fig. 2.

that by large-scale operation the reduction in sulphur will be somewhat greater than the figures found by us.

B. Specific Gravities of benzoles from the first series of investigations were determined by means of a specific gravity bottle of relatively large volume, and all determinations were carried out at 20°/4° C. The results are to be found in Table IV. and graphically in fig. 3.

TABLE No. IV.

Benzole.	Specific Gravity 20°/4°.
Crude benzole distilled up to 155° C.	0·8484
1 behandling with strength 0	0·8460
,, ,, 1	0·8456
,, ,, 2	0·8464
,, ,, 3	0·8463
,, ,, 4	0·8454
,, ,, 5	0·8445
,, ,, 6	0·8428
,, ,, 7	0·8421
,, ,, 8	0·8427

TABLE No. V.

Benzole Treated with Reagents to Constant Iodine Number.	Specific Gravity 20°/4°.
Strength 2	0·8462
,, 3	0·8441
,, 4	0·8423
,, 5	0·8423
,, 6	0·8435
,, 7	0·8453
,, 8	0·8472

C. Specific Gravities of benzoles from the second series of investigations are shown in Table V. and graphically in

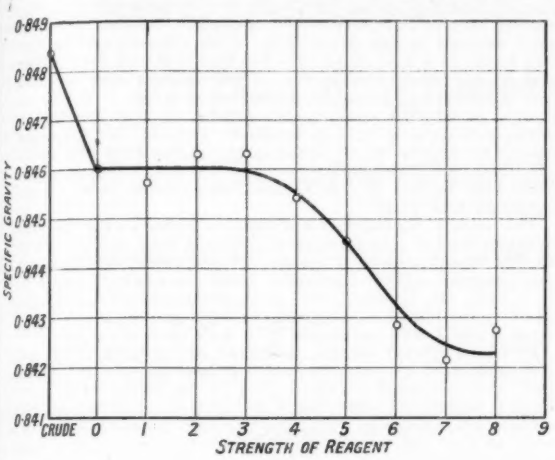


Fig. 3.

fig. 4. The rise in the specific gravity, already foreshadowed in fig. 3, appears on a much earlier stage in fig. 4, which should stand to reason, as these benzoles have received a more thorough refining.

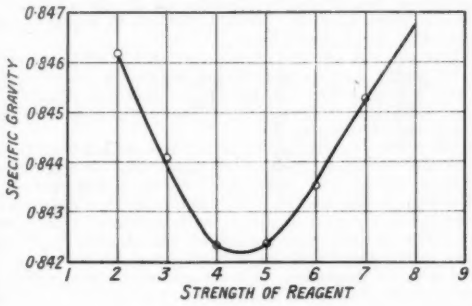


Fig. 4.

We cannot at present offer any reasonable explanation for the direction the curve takes. We can only state our observations, remembering that our refining treatment has not to our knowledge been known before, and apparently the application of this refining treatment will open out new and interesting fields of investigation, judging by the results we have so far obtained; particularly respecting the chemical constitution of the but little known unsaturated hydrocarbons that are removed by each progressive stage of operation by the various strengths of reagent—fractionated, so to speak.

We have reason to believe that our new reagent on closer investigation will throw considerable light on the actual mechanism of refining generally. We draw attention to the interesting fact that the specific gravity of the benzoles from the second series of investigations has its maximum value between reagent strengths 4 and 5, which confirms the observations we time and again have made that it is round this reagent strength that radical changes begin to occur in the benzole.

D. Engler Distillation Curves for the benzoles from the second line of investigation and the values are to be found

TABLE NO. VI.

Benzole.	1st Drop in Condenser.	Fractions in % of Volume up to—					
		100°.	110°.	120°.	130°.	140°.	150°.
	°C.						
Crude benzole distilled up to 155° C. . .	86	19·1	43·7	59·1	70·7	82·6	92·9
Refined with strength 2	87	18·4	42·5	58·1	70·0	82·0	92·8
" " " 3	86	19·4	43·3	58·2	70·2	81·8	92·7
" " " 4	87	21·3	45·3	59·6	71·6	83·2	93·1
" " " 5	87	24·1	47·0	63·0	73·5	84·5	94·0
" " " 6	85	22·7	45·3	60·9	72·5	83·4	93·3
" " " 7	86	26·0	49·0	62·5	74·0	84·7	93·6
" " " 8	86	25·5	49·0	63·7	74 3	84·7	93·8

in Table VI. and fig. 5, and, as will be seen, there is not much difference between the various relative values, the one applying to reagent strength 5 is slightly out of the general run, which is probably due to an error in the determination, but the test could not be repeated owing to the particular benzole sample giving out.

If we compare the Engler curves for the crude benzole with that for the benzole treated with reagent strength 8, the latter curve has to start with a much more pronounced rise than the first mentioned. This indicates that by the refining with our new reagent the *attack is concentrated on the fractions with the highest boiling point*, whereby the percentages of the lighter constituents increase proportionally, a fact that would seem of value in the production of a motor spirit.

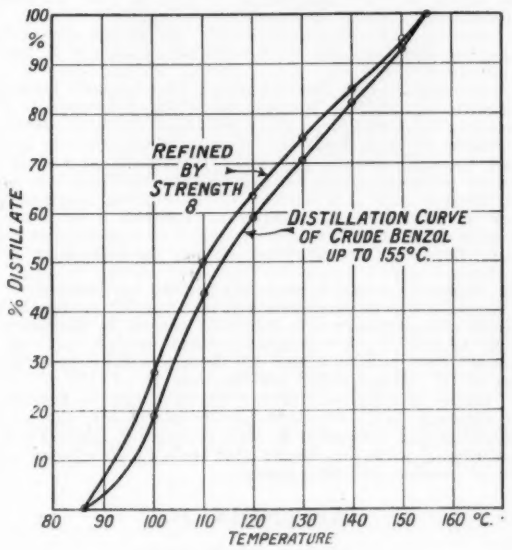


Fig. 5.

Conclusions.

We find that samples of benzole which have been treated by the new reagent, even after six and in some cases eight months of continuous exposure to daylight as well as sunlight in clear glass bottles, have shown no signs whatsoever of changes in colour, nor in refractive index, which fact, according to our view, indicates that no gum or resin forming constituents are present in the treated benzole, in spite of the relatively high iodine numbers. For instance, a benzole possessing an iodine number of 13, after 4 months' exposure to light under the above conditions, gave no residue on evaporation after the National Benzole Company's prescriptions in the standard pyrex dish.

Subjecting a series of these samples after storage in ordinary light for the above period to the action of the standard ultra-violet ray quartz lamp for 50 consecutive hours at a distance of 25 cm. from the burner gave after this gruelling test only a very slight, hardly perceptible, yellow shading in colour. Measuring the light penetration of the benzoles by the Stufen or step photometer, which instrument gives very exact readings, through the aid of a violet dish, a light penetration of the various samples gave as a result from 95% to 98% of that of the unexposed benzole, this latter being 100%. The new reagent therefore seems to be able to remove the darkening and gum forming constituents of the benzole.

APPENDIX I.

Analytical Methods Employed.

A. Iodine Numbers.—The ordinary method generally used for the determination of the iodine number—namely, the method where the Wiijs reagent is used—would give an iodine number too high. Also the determined values vary with the length of time to which the Wiijs reagent is permitted to act on the benzole mixture.

For us it was a question of fundamental importance with the present examination to ascertain exactly the behaviour of the reagent towards the benzole mixture under repeated treatments, and it was therefore necessary to find a method of determination of the iodine number that would leave no doubt whatsoever.

Consequently employment of the Wiijs reagent was out of the question.

As is well known, the Wiijs reagent is a solution of iodine and iodine tri-chloride in glacial acetic acid, and the reagent is therefore strongly acid, and it is impossible to determine the hydrogen iodide formed by an eventual substitution. To meet this contingency, the iodine number must be determined by the aid of a neutral agent. A reagent of this nature is mentioned by Mergen and Wenogradorff in *Zeitschrift f. angew Chemie*. Vol. 27, 1914, p. 241. Mergen and Wenogradorff recommend iodine and iodine tri-chloride dissolved in carbon tetrachloride, and as this solvent is quite neutral, it is possible to titrate the hydrogen iodide formed after the surplus iodine has been determined by titration. Mergen and Wenogradorff also recommend a solution containing a surplus of about 2% of iodine as the most suitable. This method was closely examined by us in our laboratory before we satisfied ourselves as to the use of the method for our work.

The iodine numbers determined by the M. and W. reagent are independent of the reaction time period.

B. Sulphur Determination.—This is carried out according to the method indicated by F. Schultz in *Petroleum* 8, 585, of Feb. 19, 1913.

By means of a clear flame, burning from a small lamp provided with a wick, the weighed quantity of benzole is combusted in a stream of air. The combustion products containing the sulphur di-oxide from the sulphur in the benzole is conducted through a wash apparatus containing 30 c.c. of 3% hydrogen peroxide, which oxidizes the SO_2 to H_2SO_4, the latter being titrated with 1/10 normal NaOH solution, using methyl-orange as indicator. A quantity of between 5 to 8 c.c. of benzole is combusted in a time of from 3 to 4 hours, the actual quantity burnt is determined by weighing the little lamp before and after.

The sulphur is stated in grammes per 100 c.c. benzole.

C. Specific Gravity is determined by a specific gravity bottle, provided with capillary side tube and ground in thermometer, reading to 0·2° C., the weighings were carried out to an accuracy of 0·2 milligramme. All determinations were carried out at 20° C.; values stated are therefore 20°/4° C.

D. Engler Distillation Curves.—These values we determined by a specially built standard Engler apparatus, the general specification and dimension as well as working method strictly in accordance with the Engler standards for fractional distillation of benzine and petroleums.

APPENDIX II.

Oxidation of Benzole.

The National Benzole Company's standard benzole oxidation test has been extensively used by us during our work on benzole. We give the following data in which a benzole obtained from high-temperature gas-works tar was oxidized after being subjected to different treatments. The crude benzole had its following Engler values:

Start to	90° C.	15·6%	by volume
,,	100 ,,	47·8 ,,	,,
,,	110 ,,	61·9 ,,	,,
,,	120 ,,	69·8 ,,	,,
,,	130 ,,	75·7 ,,	,,
,,	140 ,,	81·0 ,,	,,
,,	150 ,,	85·9 ,,	,,
,,	160 ,,	90·5 ,,	,,
,,	170 ,,	94·0 ,,	,,

This distillation range, which fairly closely represents the ordinary motor benzole specification, was procured in the following way from a crude tar benzole that was somewhat deficient in the lighter fractions below 100° C. (about 10% below 100° C. only). The benzole was fractioned in batches up to 100° C., next cut was 100 to 120° C., &c., and afterwards the cuts were mixed in the proportions that would produce the above Engler values. Naturally, by this procedure, the benzole was refined by the actual fractionation, so that the resinous gum content was rather low.

This benzole was washed with a 2% by volume 40% sulphuric acid, alkali wash, 2% by volume specific gravity NaOH sol. 1·15, followed by water washes until neutral, so that bases and acidic bodies were removed from the benzole sample, which was subsequently divided up into three parts.

No. I. sample, representing the crude benzole, gave on the standard oxidation test 6·7 milligrammes of resinous gum per 100 c.c.

No. II. sample had 9 milligrammes of pyrogallol as inhibitor added per 100 c.c., and on oxidation gave 2·8 milligrammes of resinous gum per 100 c.c.

No. III. sample was subjected to one refining treatment with our new reagent strength 5, and yielded on oxidation 2·9 milligrammes residue. The colours of the different samples were:

No. I., slightly yellow, darkened on oxidation.
No. II., slightly yellow, darkening on oxidation.
No. III. was water white, strongly refractive, and did not darken on oxidation.

We have noticed from our work on oxidation of benzoles a fact which always struck us as somewhat strange—namely, that a benzole sample with pyrogallol inhibitor, darkening considerably on oxidation, would show the same or sometimes even a less quantity of resinous gum than the same inhibitor-treated benzole evaporated in the standard pyrex dish, *but not oxidized*.

A number of observations of that kind led us to believe that perhaps the action of the inhibitor was not quite the one generally accepted—namely that of an inhibitor for the formation of resinous gums. We were further strengthened in our doubts by the observation that a deposit, similar in nature to that weighed in the pyrex dish, after evaporation, invariably was found as a film on an inverted funnel placed over the pyrex dish to improve the draught. This film was always found on the evaporating of inhibitor-treated benzole. We therefore rightly or wrongly came to the conclusion that resinous gums were duly formed in the inhibitor benzole (the changes in colour seemed to us to indicate this), but that the inhibitor interfered with the boiling points of the resinous matter so that they were soluble in hot benzole vapour, the more so as the oxidizing took place.

The mass of inhibitor is not small compared with the amount of resins formed. In some cases, where a benzole yields as much as 100 milligrammes of residue on oxidation per 100 c.c., 9 milligrammes added of inhibitor is 9%—a quantity quite likely to depress the boiling point or vaporization point. Pyrogallol itself is soluble in hot benzole vapours at 80° to 85° C., and gives a blank dish on evaporation with pure benzole.

We have carried out the following rather instructive test:

A sample of gas benzole was obtained by our extracting it from the gas supply in the laboratory by means of active carbon, a benzole of which we had our suspicions would contain quite a lot of resinous gum, and therefore more suitable for our purpose than the tar benzole, which is the only kind of benzole produced at present here in Denmark. The gas benzole has the following Engler values:

Start to	80° C.	9·25%	by volume
,,	90 ,,	51·1 ,,	,,
,,	100 ,,	75·9 ,,	,,
,,	110 ,,	83·6 ,,	,,
,,	120 ,,	91·4 ,,	,,
,,	130 ,,	95·6 ,,	,,
Above	130 ,,	= balance	

The benzole has a specific gravity at 20°/4° of 0·8240. The town gas is from modern chamber ovens and contains about 20 grammes of benzole per cub.m.

The benzole was treated with weak acid, alkali washes, followed by water washes exactly as before in order to remove bases and acidic bodies. A 100 c.c. sample was oxidized in the standard apparatus and yielded on evaporation and drying 512·3 milligrammes of resinous gum.

A further 100 c.c. sample to which was added 9 milligrammes of pyrogallol inhibitor yielded on oxidation 108·8 milligrammes of resinous substances. An inverted glass funnel was placed over the pyrex dish during the evaporation on the water bath, and was found covered in places with a film of sticky, resinous matter. The funnel was placed in the drying oven together with the pyrex dish, and the deposit after drying on the funnel weighed 4·4 milligrammes. We found on the water bath where the condensate from the funnel rim had run down quite extensive spots, where the drainings had re-evaporated, denoting deposits of gummy substances that had evaporated with the benzole vapours from the pyrex dish.

Considering that the temperature of the funnel was between 50° and 60° C., situated as it was above the water bath, it was rather remarkable that condensation occurred at all, showing the tenacity of resinous matter, but it is evident that far more gum escaped in vapour form under these far from ideal condensation conditions than we were successful in catching.

We therefore consider it proved that the change in colour of the benzole treated with inhibitor is a true indication of resinous gums being formed, and that on oxidation and subsequent evaporation that these resins escape in vapour form, being soluble in the benzole vapours, and that they would deposit themselves elsewhere given the opportunity of doing so.

We are now following up this interesting question and shall in due course publish the result of our investigations.

Engine Testing Equipment

The British Standards Institution have recently issued a revised and amplified edition of British Standard Specification No. 412. The original specification which was published in 1931 standardized the fitting for the attachment of engine indicators for the purpose of securing interchangeability of instruments so that should it be necessary to change an indicator during the course of tests on an engine, it would be possible to effect this readily and without having to shut down the engine. The other feature of the original specification was the standardization of the sizes of the indicator cards.

In the revised specification, which is really an amplification, no modifications have been made to the existing requirements, but two new sections have been added. The first of these deals with the size and form of thread to be used for the connections of all engine testing fittings, such as pipe bosses, thermo-couples, &c., with the object of securing interchangeability of testing equipment. The other relates to indicator gear.

Copies of this revised B.S. Specification (No. 412-1935) may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1. price 2s. 2d., post free.

Southern Association of Gas Engineers and Managers

Annual General Meeting in London

There was an excellent attendance of Members at the Annual General Meeting of the Southern Association of Gas Engineers and Managers, held on Thursday, March 28, at the Hotel Metropole, W.C. 2. Mr. E. L. NICHOLAS, of Guildford (the President), occupied the chair.

THE NEW PRESIDENT,

Mr. E. L. NICHOLAS, of Guildford.

Mr. E. L. Nicholas was born at Exeter and subsequently studied engineering at Exeter University College He was articled to Messrs. Willey & Co., Engineers, of that city, where he served his apprenticeship in the Drawing Office and Workshops. For the next few years he was engaged on the design and erection of gas-works plant on behalf of that firm in various parts of the country. In 1909, Mr. Nicholas was appointed Chief Draughtsman to the Cardiff Gas Light and Coke Company, and later acted as Constructional Assistant to Mr. H. D. Madden on a large scheme of extension and reconstruction of that Company's Grangetown Works. Ten years later he was appointed Deputy Engineer and Manager to the Blackburn Corporation Gas Department, going to Guildford as Engineer and Manager in 1923. In the following year, on the retirement of the Secretary (the late Mr. W. Titley) he was appointed to that position also.

The Luncheon.

At the luncheon which preceded the business meeting, the toast of "The Visitors" was proposed by Mr. R. J. H. CLARK (Plymouth), Vice-President of the Association. He referred first to the Chairman (Mr. W. T. Patrick, J.P.) and Directors of the Guildford Gas Company—a Board whose virility was reflected in the 43% in four years increase in the sales of the Undertaking—and to Mr. Valon Bennett, a member of the Association but just now a visitor in his capacity of President of The Institution of Gas Engineers, the highest honour attained within the Industry. A hearty welcome was also extended to the representatives of the National Bodies, of the City and Guilds, the Junior Associations, the Technical Press, and to their old friend and late Hon. Secretary, Mr. J. H. Donaldson, now retired.

Mr. W. T. PATRICK, in reply, extended a cordial invitation to the Association to visit Guildford.

Mr. H. D. MADDEN (Cardiff) proposed "The Southern Association," coupled with the name of their President, whose association with him during the time he (Mr. Nicholas) was Engineering Assistant at Cardiff Mr. Madden recalled in the happiest terms. The whole staff at Cardiff, and another old friend in South Wales, Mr. Octavius Thomas, had asked Mr. Madden to convey their good wishes to the President.

Replying, Mr. NICHOLAS referred with the greatest pleasure to the presence, not only of Mr. Madden, but of two others of his old Chiefs—Mr. R. J. Rew, of the Devon Gas Association, and Mr. G. P. Mitchell, lately of Blackburn, now Engineer of the Worcester New Gas Light Company.

Mr. VALON BENNETT proposed the health of Mr. Nicholas, and thanked him for presiding at the luncheon.

The General Meeting.

The PRESIDENT having referred with pleasure to the presence of Mr. C. Valon Bennett, as President of The Institution of Gas Engineers, the minutes of the previous meeting, as published in the "GAS JOURNAL," were taken as read and confirmed.

On the proposition of the PRESIDENT, seconded by the VICE-PRESIDENT (Mr. R. J. H. Clark, of Plymouth), the Report of the General Committee, as circulated to members, was unanimously adopted.

New Members.

The following applicants were then elected to membership of the Association on the proposition of the PRESIDENT, seconded by the VICE-PRESIDENT.

J. C. Cotterill (Oakhampton).
T. Handel (Ilminster).
H. H. Brown (Southampton).
B. Long (Horley).
F. Dawson (Gas Light and Coke Company).

The PRESIDENT announced the appointment of Mr. T. Carmichael (Portsmouth) as the Association's representative on the Council of The Institution of Gas Engineers.

Presentation to the Past-President—

The PRESIDENT then made the presentation of a silver salver, suitably inscribed, to Mr. Stephen Lacey as a memento of his year of office as President of the Association. Mr. Lacey, he said, was a very busy man, holding a high position in the largest gas undertaking in the world. It was therefore a great honour—and one which they fully appreciated—that he had given up his time last year to be their President. They remembered with pleasure their visit to Watson House and the Fulham Gas-Works and the preparations made for their comfort and instruction. Mr. Lacey had worthily upheld the traditions of the Association, and had held the office with dignity. In making this presentation, Mr. Nicholas concluded by congratulating Mr. Lacey on his election to Vice-Presidency of The Institution of Gas Engineers.

Mr. LACEY, in acknowledging the presentation, thanked the members most sincerely for this memento of his year of office. It formed tangible evidence of the fact that he was one of the Past-Presidents of this Association, and he felt it a very great honour. It would also call to mind the friendly spirit which always pervaded their meetings, the willing co-operation of the General Committee during his year of office, and the unfailing services of the man on whom five Presidents had relied—their good friend and late Hon. Secretary and Treasurer, Mr. J. H. Donaldson.

—And to the Retiring Hon. Secretary.

Mr. Lacey went on to present to Mr. Donaldson an inscribed grandfather clock as a token of their appreciation of his valued services to the Association during the past five years. There was no possible doubt, he said, that the continued success of this Association, and the maintenance of its reputation, usefulness, and status was really due to the fact that they had been very fortunate in having three Hon. Secretaries who had served them as long as five years each. Those Hon. Secretaries carried the main burden of the work of the Association. They were all very sorry to lose Mr. Donaldson, and they wished to thank

him very heartily indeed for all he had done for them. One last good deed was to find an able successor.

Mr. J. H. DONALDSON, in acknowledging the presentation, expressed his sincere thanks to all those members of the Association who had subscribed towards it. It would remind him of the five happy years he spent as their Hon. Secretary and Treasurer and of the many friends he made during that period. He had no regrets that he had taken over this office; his only regret was that it was impossible to continue. In conclusion, he wished his successor every success and hoped that the Association would go on from strength to strength.

Presidential Address of E. L. Nicholas, Guildford

Before I commence my Address, I would like to thank you for the great honour you have conferred upon me in electing me your President for the year. It is characteristic of our Association that this office does not necessarily go to a member who is responsible for a large undertaking.

So many Presidential Addresses have been given to this and to other Associations that it is difficult to speak on any new subject. I propose, therefore, to give you an account of our activities at Guildford, some of the difficulties encountered, and the success or otherwise that has attended our efforts, claiming your indulgence if it is considered that my remarks would be more properly contained in a Paper than delivered on an occasion of this kind.

The Company which I have the honour to serve was among the earliest in the field, being formed as far back as 1824. Like many other towns in the south, Guildford preserved an almost entirely residential aspect till the early post-war years, when a gradual though decided change came about. The movement of industry from the north, the tendency for those residing in outer London to live farther from the Metropolis, and the electrification of the railway were all contributing factors, bringing in their train new industries, increased population, housing schemes by both private and municipal enterprise, and a demand for an improved standard of living generally.

It became necessary, therefore, for all public utility undertakings to plan well ahead of present requirements.

The Works.

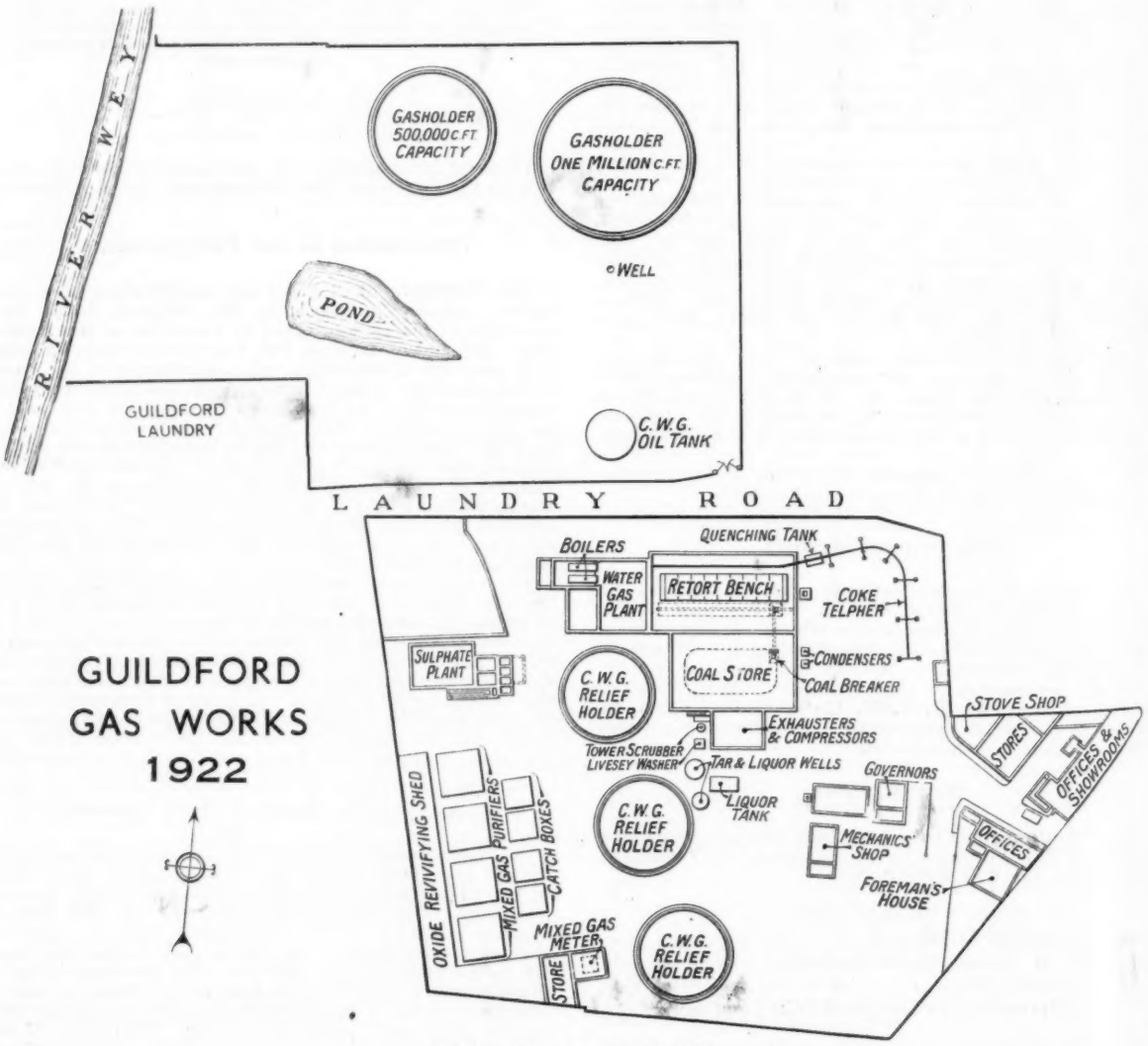
When I was appointed to Guildford at the end of 1922 the gas sold for the year was 220 million c.ft., the maximum day's output being 922,000 c.ft.

The works at that time were as shown in Plan No. 1. The carbonizing plant consisted of nine beds of horizontal retorts with an early type Fiddes-Aldridge charging machine. The retorts, having ascension pipes at one end only, were a continual source of trouble through stoppages. Moreover, they had worked throughout the war period when there was little opportunity to do more than the most urgent repairs.

Coal was hauled to the works from the railway station and dumped into store, where it was handled by an electric telpher which either stacked it or fed an elevator supplying the continuous overhead bunkers in the retort house.

Coke was discharged into skips on the stage floor and carried by an electric telpher to the yard.

The auxiliary manufacturing plant comprised a single set for the manufacture of carburetted water gas, situated at the west end of the retort house and effectually barring any



The Works as they were in 1922.

extension of the latter in that direction. There were three holders in cast-iron tanks for storing carburetted water gas, each having a capacity of about 100,000 c.ft.

The coal gas washing plant comprised a Cockey washer and a centrifugal vertical scrubber, with a capacity of 1 million c.ft. per day each. There were four purifiers, each 25 ft. square, dealing with mixed gas, and four smaller boxes which had been out of use for some time, though not dismantled. One station meter served for mixed gas, and it was only possible to ascertain the coal gas make with accuracy when the C.W.G. plant was not working.

The total storage room for mixed gas was 1,500,000 c.ft. in two holders, one having a capacity of 1 million c.ft., erected in 1897, the other half that size and then only recently erected.

The consumption increased to such an extent that it became apparent the works would soon be quite inadequate to cope with the demand, more particularly as a vigorous policy of extension was adopted in those parts of our area not yet supplied with gas.

Accordingly I prepared a comprehensive scheme which would eventually enlarge the works to manufacture 2 million c.ft. of coal gas per day, roughly double the maximum output at that time. It was so planned that the earlier part of the work was to consist of reconstructing and modernizing the existing plant, leaving the extensions and new plant until the utmost had been done in the former direction. By these means the cost was spread over a number of years and actual capital expenditure was postponed until such time as it was absolutely essential. Each section of the work was to be carried out so that it would become part of the complete scheme.

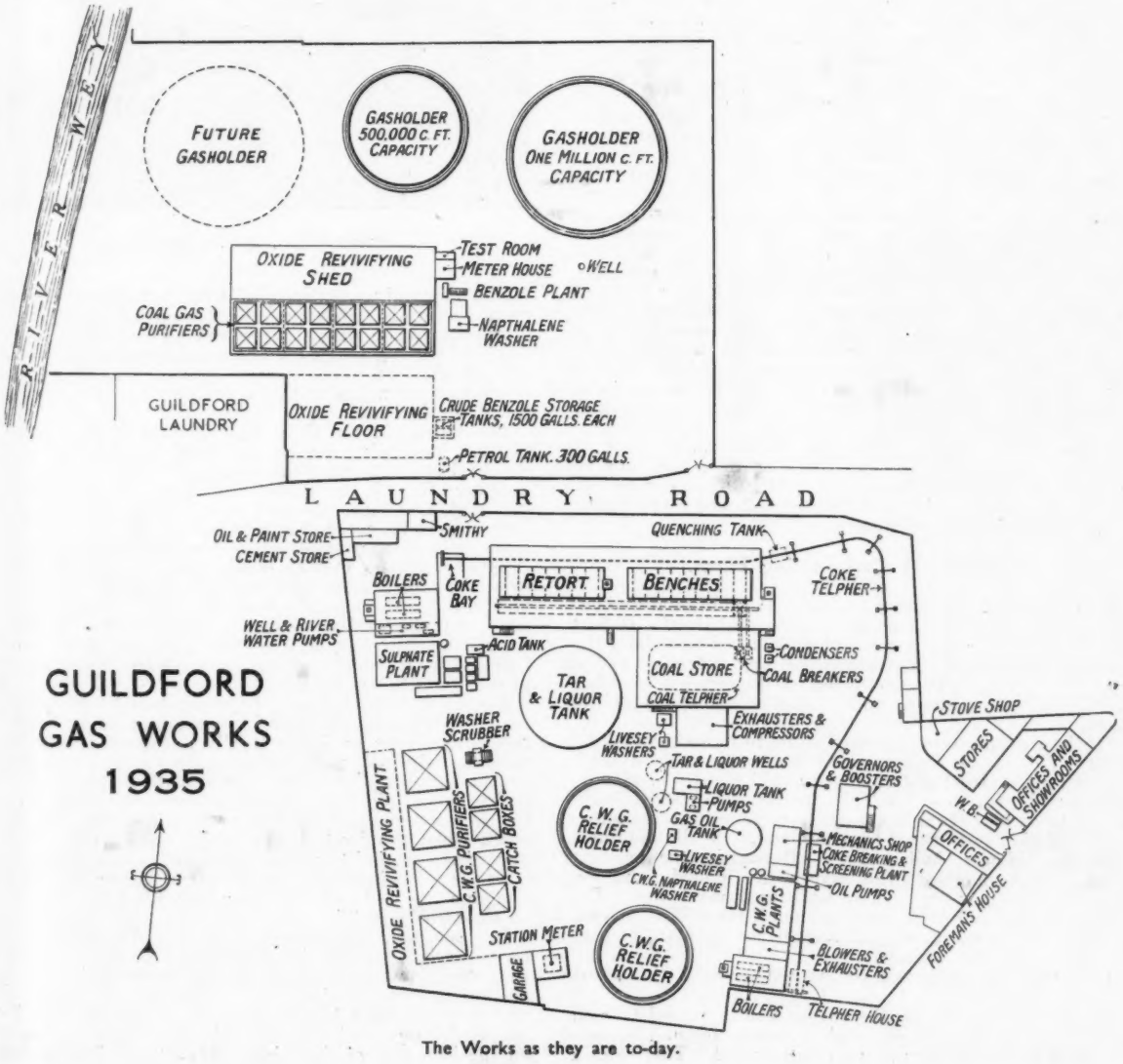
The opportunity to design and lay out a complete new Works is given to very few Engineers, but that should not deter anyone from making the best of the available material and incorporating it in any reconstruction scheme so that over a number of years much the same result may be obtained.

My Directors, who gave me every encouragement and support, approved the scheme, and I was empowered to proceed with the various sections as required. A programme was drawn up, and although, of necessity, there had to be slight modifications from time to time, it was actually adhered to very closely.

The first three years were devoted to rebuilding the whole of the retort settings to ground line. No alteration was made to the gas offtakes on account of the expense involved in providing additional ascension pipes and hydraulic mains. I had good reason later not to regret this, as it left me free in my selection of new carbonizing plant. Concurrently with the re-setting of the retorts a Fiddes-Aldridge machine of the newest type was installed, and additional coal and coke telpher machines and a new coal elevator were provided. When each of these machines was working the old ones were thoroughly overhauled, and we felt reasonably safe against breakdowns.

The washing plant was replaced by a Livesey washer and a Holmes rotary scrubber washer, each of 2 million c.ft. capacity per day.

During the next two years the C.W.G. holders were overhauled. It was decided to retain two only and to convert the third and oldest into a tar and liquor tank. These holders were originally built about 1860 and considerable repairs were advisable. The tanks, which were of cast iron and partly underground, were emptied of water, sumps being sunk outside to keep the surface water down meantime. As a result of our examination, the crown framings were strengthened, new bottom rollers fixed, and the sides and crowns were entirely re-sheeted. In spite of the precautions taken to avoid trouble with the surface water, these did not prevent one tank lifting several inches in the centre, and as a result nearly every bottom plate



The Works as they are to-day.

cracked at the corners. In order to allow it to settle down, a number of holes were drilled in the bottom plates, and pipes were screwed in, up which the surface water discharged. The inside of the tank was kept clear of water by pumping, and the outer sump was also kept down by the same means. After the repairs were completed the bottom of the tank was concreted over and water admitted. When the water in the tank reached nearly to the top of the vent pipes, these were filled with grout and plugged, and the tank settled down evenly and watertight. The other two tanks provided no such difficulties.

No unnecessary expense was incurred in converting the third holder into a tar tank. The columns and girders were dismantled, and the holder was left in the tank. The space between the top curb of the inner lift and the top flange of the cast-iron tank was covered by a ring of radial steel sheets. Simultaneously with this work, the covers of the small purifiers were re-sheeted and the boxes put into use as catches.

The large holder, which was erected in 1897, had been giving trouble for some time. The cups were leaky and required a more or less constant supply of water. This holder was of rather unusual design. It had four lifts in a steel tank. The inner or top lift was of the " flying " type and on the spiral principle, whereas the other three lifts were column-guided. When the flying lift was extended some undue strain seemed to be exerted on the other parts of the holder, with the result that it became seriously out of level. For several years, therefore, it had been deemed inadvisable to work more than three lifts, which meant a great reduction in the effective storage capacity. In 1928 it was arranged to lower the holder, empty the tank, and make a thorough examination.

The makers were called into consultation and very readily co-operated. Finally, it was decided to discard the spiral rails and rollers on the inner lift and fit crown carriages and bottom carriages in lieu thereof. The columns were provided with gathering brackets at the top in order to engage the top rollers safely when descending.

At the same time, the three cups were tested and every loose rivet was taken out and replaced. All cups and grips were scraped and well painted with red lead inside and outside, and the carriages were fitted with new spindles and brasses and proper adjustment included. This work lasted some five months, and, as will be readily understood, conditions were rather difficult at times with two-thirds of our storage capacity out of action.

On completion of the work, the tank was filled with water and it was hoped that all our troubles were over. When the holder was put into commission, however, we experienced heavy pressure on the works, which was traced to water in the holder inlet, obviously coming from the tank. There was no option, therefore, but to re-empty the tank, when we discovered that the flanged joint between the inlet pipe and the tank had opened. This apparently had taken place during the time the repair work had been in progress, and it had occurred to no one to examine it before re-filling. This joint was re-made, and no further difficulty was experienced when the tank was again filled. I mention this particularly for the benefit of anyone who may contemplate emptying a steel tank.

It was a great relief to have the holder safe to work at its full capacity after so long a time. It is only fair to the Contractors who erected the holder originally to say that it was designed by and constructed under the supervision of a Consulting Engineer.

Additional Carbonizing Plant.

It next became necessary to deal with additional carbonizing plant, and here a problem presented itself. It had been decided to adopt horizontal retorts and to extend the existing installation. Unfortunately, any extension of the retort house had to be carried out at the expense of either the C.W.G. plant at one end or of the coke yard at the other.

The best proposition appeared to be to move the C.W.G. plant. This meant first erecting a new plant on a fresh site and afterwards modernizing the old plant and placing it alongside the new one. Contracts were accordingly placed for a new Humphreys & Glasgow unit to manufacture 1 million c.ft. per day, complete with all buildings, exhauster, blower, boiler, &c. Afterwards, the existing plant was dismantled, thoroughly overhauled, and re-erected on the new site with an additional new boiler. The old boilers which had become too small for C.W.G. manufacture were re-erected elsewhere for general works purposes.

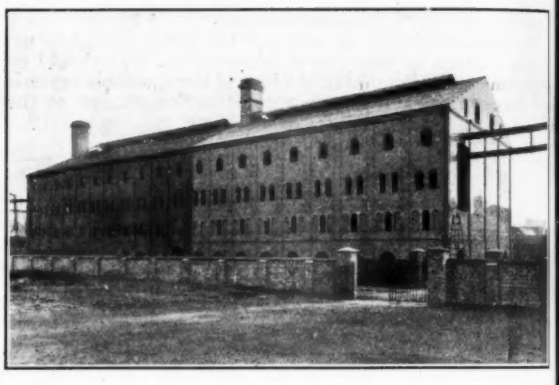
The field was then clear for an extension of the retort house.

By this time, however, the output had increased to such an extent that the purifiers and station meter had become too small earlier than had been anticipated. This section of the scheme, therefore, had to be speeded up and dealt with at the same time as the carbonizing plant so that it could all be brought into operation together.

The opportunity now presented itself of keeping separate control over both streams (carburetted water gas and coal gas) by retaining the existing purifiers and meter for C.W.G. only. This was taken advantage of, and it was arranged that the new plant should be erected on a clear site for coal gas only near the gasholders, where there was ample room for a good layout and for future extensions if necessary.

Accordingly, at the end of 1928, drawings and specifications were prepared for this part of the work. For some time I had been impressed with the possibilities of the Congdon standpipe principle, and, after inspecting one or two installations, recommended my Directors to try it at Guildford. This I have never regretted. The freedom from stopped pipes, and being able to entirely dispense with the services of " pipe jumpers " alone have made it worth while.

The extension consisted of lengthening the retort house and building seven additional arches, three of which were to be filled in at once, leaving the remaining four arches to be filled when required. The coal bunkers were extended the full length of the retort house at one operation. The foundations for the retort house and benches entailed a considerable amount of work. The site which had housed a C.W.G. plant for over 30 years was, to say the least, not an ideal one.



Retort House, showing Extension.

Underground separating tanks, wells, and tar mains were everywhere. In addition, by reason of its level and proximity to the river, the ground was waterlogged. The whole of the old shallow foundations were cleared out and precast piles were driven down to depths varying from 15 to 40 ft., over which a reinforced concrete raft was laid to carry the structure.

The retorts in the three new settings were built up in sections, two being constructed of B. B. Stourbridge fireclay and one of Oughtibridge silica. These retorts are still working after 5½ years (with occasional breaks for patching, &c.), and there does not appear to be any appreciable difference in the wear of any of them.

The coke telpher track was extended round the works to supply the boilers, C.W.G. plant, and screening plant direct from the retort house without further handling. The new purifying plant comprised four boxes 35 ft. square by 6 ft. deep, on the outlet of which was installed a Holmes' naphthalene washer of 2 million c.ft. per day capacity, followed by a Connersville meter. All this work was completed by October, 1929.

February, 1929, will long be remembered for a period of very severe frosts. We had as we thought safely weathered the winter, only to find a totally unexpected peak thrust upon us. It was particularly exasperating coming while our new carbonizing plant was actually being built. We had to meet daily increases of 50% over the previous year, for over a week, and finished up with only 100,000 c.ft. in stock when the frost finally broke on Feb. 19. I have never been so glad to see rain in my life as on that night.

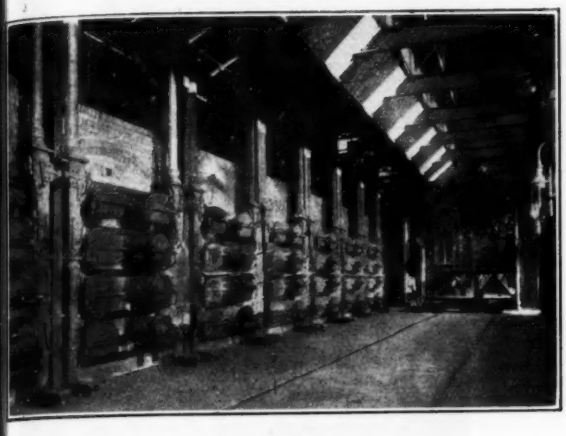
In the following year, as a result of our experience with Congdon, the four spare arches were filled in with retorts on the same principle.

By 1932, four beds of retorts in the old section were due for re-setting, and in view of the greatly improved results that had been obtained from the new settings, it was decided to scrap the hydraulic mains, ascension pipes, &c., and convert them to Congdon. It was then that I was thankful that no additional expenditure had been incurred on the ironwork of these beds previously. The same pro-

cedure was adopted in 1934 when a further three old beds were due for re-setting. There are now fourteen beds of retorts constructed on this principle, leaving two spare arches for future extensions.

In 1933, a benzole recovery plant was erected in conjunction with the naphthalene washer.

Plan No. 2 shows the works as they exist to-day. The

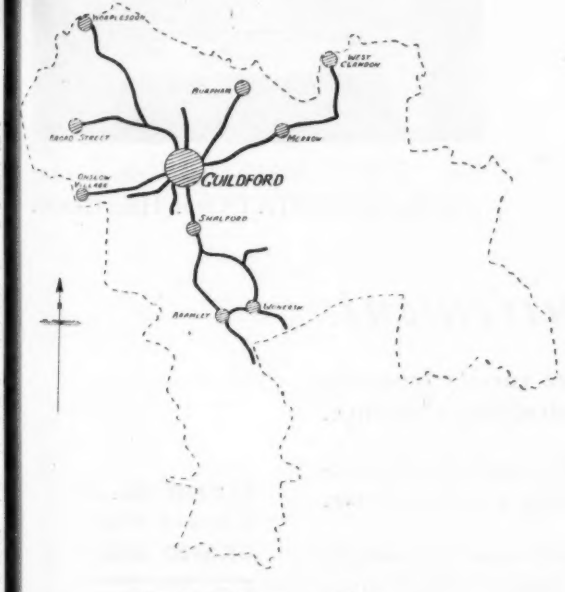


Elevation of "Congdon" Retort Bench.

maximum day's output so far is 1,787,000 c.ft. and the total gas sold for the year 1934 was 413 million c.ft. Compared with 1922 the year's increase was 193 million c.ft., or 88%, the maximum day's increase being 865,000 c.ft., or 93%.

The District.

All the while that the Works were being reconstructed and enlarged the distribution department received its share of attention. Each year the mains were taken farther afield and new villages were added, thus ensuring a steady



1922.

increase in business. When mains were completed in a new district the Village Hall or Institute was engaged and an exhibition was held at which Cookery Demonstrations were given. This policy was always well rewarded by results.

High-pressure mains were laid to re-inforce the pressure at weak places during peak loads and wherever possible "dead ends" were linked up. Constant touch was kept with builders and architects and new property carcassed during erection, with obvious advantages.

The mains mileage, which in 1922 was 65 miles, had grown by 1934 to 140, and during that time a dozen additional villages had been given a supply. Consumers increased from 7,998 to 14,626.

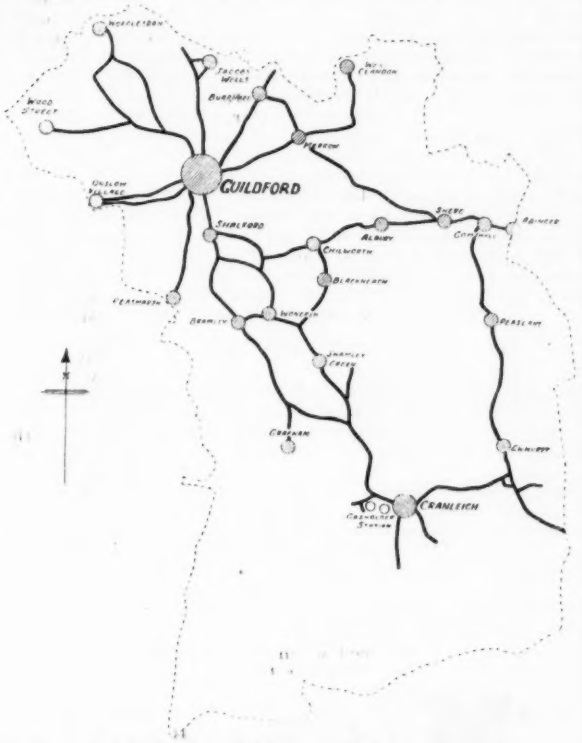
Capital Expenditure.

As may be imagined, all this new work both on plant and distribution meant the expenditure of a considerable sum of money; but in spite of tnat the capital expenditure stands to-day at less than £660 per million c.ft. made.

Enlargement of Area.

In 1932 my Company purchased the undertaking of the Cranleigh Gas and Electricity Company, whose area was contiguous to our own. Their gas sales for 1931 were 26 million c.ft. By reason of our better resources we had been able to increase this in 1934 to 31 millions, an addition of 19% in three years, and we had reduced the price by 2d. per therm.

The Cranleigh Works were some nine miles from our own, and the obvious plan was to run a high-pressure main between the two works for filling the Cranleigh holders. This



1935.

meant also the provision of compressing plant and heavy costs for excavating and reinstating the concrete roads of Guildford's congested main thoroughfares.

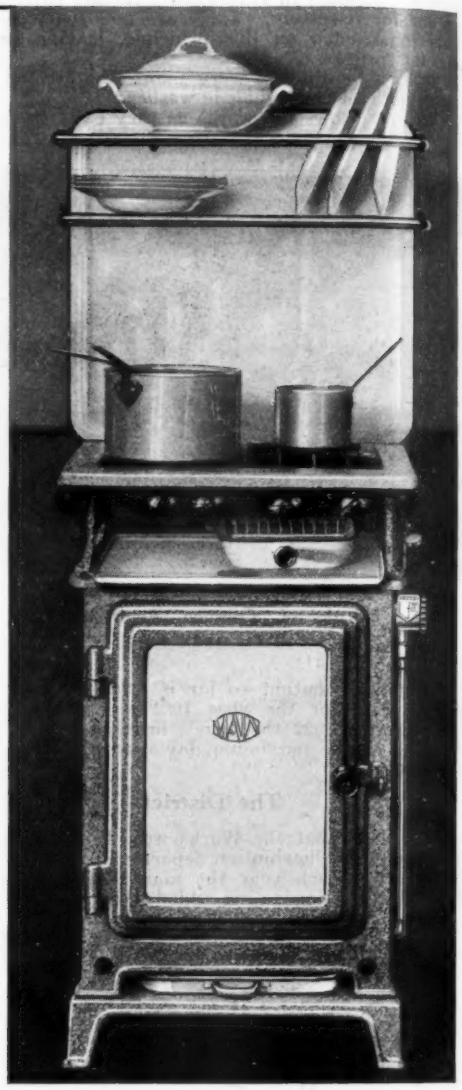
Considerations of cost and time made it expedient to devise some other method of supplying until such time as the increased consumption warranted the greater expenditure.

We had at that time two 6-in. low-pressure mains each terminating about three miles from Cranleigh, but on different roads. At Cranleigh was a small holder giving only 2½ in. pressure. It seemed a perfectly safe proposal to continue these two mains to a point where they would meet and run an 8-in. main thence to the holder inlet. The route was through a country district, the mains could be laid under the grass verges and nearly one hundred additional consumers connected *en route*. After a long series of pressures had been taken to test the capacity of the existing mains, they were extended in steel and tested to 20 lbs. pressure, so that at any future time they could form part of a high-pressure main between the two works.

The exhausters which originally brought the gas away from the retorts at Cranleigh were utilized to transfer the gas from the small holder to the one supplying the district.

The scheme, which at first sight might not appear

MAIN



The SUPER MAINSERVOR Cooker with the MAINSTAT Oven Heat Control

Made for your requirements

MAIN Cookers are manufactured in a large variety from the simple hire cooker to the highest grade of cash selling appliance.

They are specially designed to meet YOUR requirements, because only in this way can the consumer become a satisfied user.

He depends upon YOU to supply his need—and we supply YOUR requirements. This is the only policy which gives all-round satisfaction and MAIN Cookers have always been produced on these lines.

STAND No. 48
Ground Floor
GRAND HALL

R. & A. MAIN LIMITED, LONDON AND FALKIRK

London Office and Showrooms: 48, Grosvenor Gardens, S.W.1. ● Glasgow Office and Showrooms: 82, Gordon Street

theoretically sound, was entirely successful, and we have been able to feed the holder without difficulty and without interfering with the supply to consumers along the route. In less than nine months after taking over the Company we had closed the works, with considerable financial advantage to ourselves and benefit to the consumers by reason of the more uniform quality and pressure of the gas supplied.

I might mention here that we were able to get a very appreciable allowance for obsolescence from the Income-Tax Authorities in respect of the displaced manufacturing plant at Cranleigh.

Electrical Competition.

It may be thought because of our greatly increased consumption that we have very little electrical competition to contend with. We have, in fact, a very keen and efficient rival in the local Municipal Electricity Undertaking, and it would be idle to pretend that we are unaffected by their activities.

In one year the loss of the street lighting alone meant 12 million c.ft. and this was further aggravated in the following year by a sustained attack on our slot lighting business which is continuing with some success in spite of all we may do in the way of maintenance.

We have to some extent met this latter loss by the installation of coppers and fires in slot consumers' houses and these appliances are now regarded as standard in all new installations. In the last 3 years 1,085 coppers and 614 fires have been fixed under this scheme. More recently, of course, it is the cooking load which is being singled out, with current at ½d. per unit.

Severe though this competition is, I am not alarmed by it, nor do I see any cause for pessimism. It has, at any rate, the merit of keying everyone up to greater efforts. We must, I think, realize that it will intensify as time goes on whether we like it or not, and it is up to us to go out to meet it, having first made sure that our price and service are right—avoiding panic or embarking on schemes that are uneconomic just to hold or secure any particular load or consumer.

One often hears the view expressed in certain quarters that electricity is being more or less forced on to the public. With perhaps a little more information than is usually at the disposal of a Gas Engineer I can assure you that a great part of the public requires very little persuasion to give it at all events a trial in one way or another.

The younger generation, particularly, is attracted by new ideas, and we have to prove to them and to others that although we are old-established we are not old-fashioned.

Supply of Electricity.

When we acquired the Cranleigh Undertaking we were fortunate in securing powers to supply both gas and electricity throughout the added area (about 35 sq. miles).

No sooner had we taken over control than we were inundated with inquiries for extensions of cables in all directions. These, of course, received very careful attention, and we found no difficulty in obtaining satisfactory guarantees as to revenue.

A few figures as to the progress of this department may be interesting:

	Units Sold.
1931 (last year of the old Cranleigh Company)	114,789
1932	137,848
1933	167,891
1934	274,592

Thus, in the three years my Company has been responsible for it the consumption has increased by 139%, and the number of electricity consumers has increased from 157 to 468, or 191%.

These figures relating to electricity are given merely to illustrate how easy it is to get increases in consumption even when the price charged for current is 7d. for lighting and 2d. for heating and power.

Hire or Hire Purchase.

Most of us I expect have given much thought to the relative merits of simple hire and hire purchase when considering the replacement of old appliances on the district and particularly black cookers.

Let me say at once I am a firm believer in getting the consumer to buy his apparatus either for cash or by some means of hire purchase, feeling that we are much more sure of his future custom in these circumstances than if he were merely hiring appliances that might be on our hands again at any time.

Some years ago my Company ceased to issue appliances on simple hire, and those outstanding have gradually grown less and less until there are at present only 159 black cookers belonging to the Company on hire. There are no fires, radiators, or water heaters under this category.

In 1924 we commenced the sale of appliances by hire purchase over three years, and the following table gives the sales in each year since then:

Year.	Number of Appliances Sold.	
1923	471	Cash sales only
1924	673	
1925	780	Cash and hire purchase
1926	819	
1927	747	
1928	756	
1929	780	
1930	849	
1931	852	
1932	889	
1933	929	
1934	955	

Except for the years 1925 and 1926, when unusually larger numbers of consumers were added, it will be noted the figures are fairly progressive. During the last three years it has been possible to hire at nominal rates any electricity appliance from our chief competitors. Moreover, they make no charge either for installation or maintenance, or for laying in the service cable. In spite of this the rate of progress is at least maintained.

The 1934 figures would have been considerably higher but for the abnormal mildness of December. As from Jan. 1 of this year we have extended the period of hire purchase of enamelled cookers to slot consumers from three to five years, and the figures up to date have amply justified this action, sales having trebled under this heading.

After every new cooker is fixed on the district a call is made by our lady demonstrator, whose duty it is to ensure that the customer not only understands the working of the appliance, but is quite satisfied with her purchase.

Price of Gas.

In these days when prices and tariffs of various kinds are under consideration, it may be of interest to state that our present basic price is 9·6d. per therm. A cash discount of 2½% is allowed if payment is made within 30 days of the end of the quarter.

All gas consumed for the first three quarters is paid for at the same rate, but in the last (or December) quarter a special rebate is given off the whole year's consumption according to quantity. The maximum rebate is 2d. per therm for 10,000,000 c.ft. or over, and we find the scheme gives general satisfaction.

We have one industrial consumer taking over 11,000,000 c.ft. per annum at this price of 7·6d. and over 100 who consume between 250,000 and 5,000,000 c.ft. per annum. Domestic consumers under the scale number 183 who take between 100,000 and 250,000 c.ft. each per annum.

In the foregoing remarks I have not attempted to give a detailed account of any of the plant installed or its operation, but rather a general summary, in the hope that those who are interested will look over the Works when they visit Guildford in the summer.

I would like to emphasize once again a point which I made at the beginning of my Address. The heavy programme of the past twelve years has been due almost entirely to local development, and this, as a result of post-war conditions, assumed a rapidity which my predecessors could not possibly have foreseen, and which, consequently, could only be dealt with as and when it arose.

In conclusion, may I say how much I owe to the Southern Association. The friendliness of members generally and their willingness at all times to exchange ideas and experiences have been extremely helpful to me on many occasions, and I am glad to have this opportunity of placing my thanks on record. I regard this spirit as one of the Association's most valuable features.

Vote of Thanks.

Mr. JOHN TERRACE, in proposing a hearty vote of thanks to Mr. Nicholas for his Presidential Address, observed that the information contained in the Address was such that would be useful to all of them. But he submitted that, in addition, it gave them a very good idea of the calibre and ability of their President. As a constructional engineer, Mr. Terrace said that he was naturally interested in that side, but when they came to the smaller details on the distribution side he was sure everyone would have obtained many points of interest. Their Association,

he continued, covered a very wide area, and in the past they had had many distinguished men as Presidents, each one of whom went through the usual routine of reading his Presidential Address and conducting the affairs of the Association. It was a valuable training ground, and they claimed that the Southern Association had done as much as any in providing men who had taken a prominent part in the activities of the Industry. Mr. Terrace remarked that he had a long association with their Association, and now that he was out of active work he could sit back and look on, and judge things from viewpoints which many of those occupied in the daily rush of routine work were unable to do. It had fallen to his happy lot to be associated with their President some ten years ago in the early days of the work he was starting at Guildford. He was then much struck with his ability and grasp of the work he was setting out to do—and that was fully borne out that afternoon.

Mr. R. J. REW, in seconding the vote of thanks, remarked that he first met Mr. Nicholas in the drawing office when they were both trying to puzzle out the mysteries of the slide-rule. He was always a valuable colleague. When he left Exeter he took away with him their Civic Motto, *Semper fidelis*—and Mr. Nicholas had been ever faithful to his Undertaking, to this Association, to the Industry, and to his old friends. Mr. Rew said that he had had something to do with the development of rural districts, so that he could appreciate the amount of work Mr. Nicholas had done in that direction. In conclusion, he observed that it was very gratifying to see Mr. Nicholas occupying so important a position in the Association, and he hoped that he would figure largely in the future of the Industry.

The PRESIDENT briefly acknowledged the vote of thanks, which was heartily accorded, and in concluding the business of the meeting he extended on behalf of his Chairman and Directors a cordial invitation to the members of the Association to visit Guildford on Tuesday, June 25 next.

Gas Fitters and Shock Risks

By H. C. WIDLAKE, Assoc.M.Inst.Gas E., A.M.I.E.E., A.M.I.Mech.E., of the Plymouth and Stonehouse Gas Light and Coke Company

It is only in recent years that gas undertakings have awakened to a realization of peculiar risks attending the use of gas and electricity on the same premises. There is real need for protecting fitters against risks of electric shock and possibly fire, which under certain conditions may arise in the course of their duties. Escapes, mysterious fires, and shock risks in a house where joint use is made of gas and electricity, all have their origin in a common cause—namely, a fault or leaking current seeking a path to earth via the gas service pipe instead of by the legitimate path provided for the flow of such current.

So long as the gas meter remains connected, the fact that a minute earth bound current is flowing through it is of very little moment, but when the connections to the meter have to be broken in order to change the meter or carry out some other work, conditions dangerous both to the person of the fitter and the house itself are immediately created, and it is essential that fitters should be safeguarded against this insidious danger.

So long as the continuity to earth of the gas system is maintained, the entire run of conduit, gas pipes, and gas meter is kept at earth potential, but as soon as the meter connection is broken all pipes, conduit, and apparatus on the house side of that break will become charged at a dangerous electrical potential and serious or even fatal shocks could be received from such metalwork. This charged metalwork includes conduits or cable sheaths, gas pipes, cookers, and fires. Where the connected gas apparatus includes water heating apparatus in which the cold water supply pipe and the gas pipe are in good metallic contact with one another via the body of the apparatus, this dangerous condition does not arise.

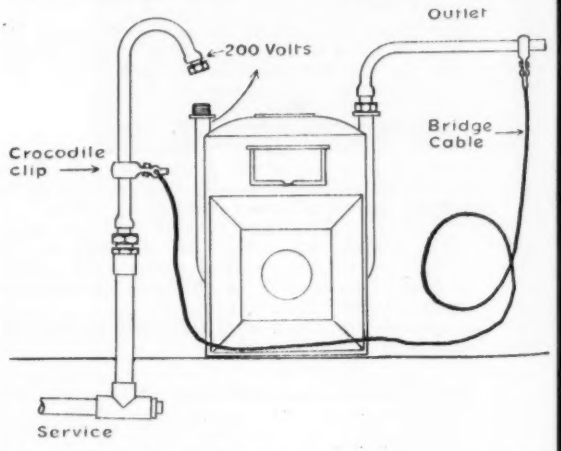
The alternative earth provided by the presence of water heating apparatus cannot always be relied upon, due to differences both in the design of such apparatus and the manner of installation.

The illustration shows a gas meter with outlet connected. If an earth bound current has been flowing through this meter, the action of breaking the circuit by disconnecting the inlet has caused a difference of potential of 200 volts to be established between the body of the meter and the service pipe. Meters are often fitted in confined spaces, and in these cases there is a grave danger not only of the fitter receiving a severe shock, but of his being unable (due to muscular reaction) to break away from the points between which he has been trapped. In one case within the author's experience, a connection for a second meter was being made on a service pipe. A slight spark occurred as the inlet connection was broken, the gas was ignited at the end of the service pipe before the fitter could get his prepared fitting in place, and a serious fire resulted. In this case, the trouble was brought about by a wireless amateur who had earthed a defective high tension eliminator to a gas pipe.

It is no unusual thing for fitters to report having received a shock or observed a spark when disconnecting a gas meter, a clear indication that the gas system was carrying an earth bound current.

The remedy against occurrences of this sort is as simple as the evil is serious. It is only necessary to bridge inlet and outlet pipes by an electrical conductor so that when the meter is disconnected the circuit to earth is not broken but is maintained by the presence of the bridge. This bridge, as adopted by the Plymouth and Stonehouse Gas Company for the use of its fitters, comprises a 7-ft. length of flexible C.T.S. cable fitted at each end with a heavy crocodile type clip. These clips are large enough to embrace a 1½ in. gas pipe and can be fixed in the position shown in the illustration in a few seconds.

This bridge is fixed in place before a job is commenced and only removed after all work has been completed. It ensures that no potential difference can exist in the vicinity of the disconnected meter, even though the gas system may be carrying an earth bound current, and permits of work being carried out in absolute safety both as regards shock and fire risks.



The Company's fitters are instructed to regard every meter as a possible medium via which a leakage current may be leaving the premises and fix the bridge in position as a matter of course before commencing work.

Reference has been made to a serious fire which was caused in the manner described by a faulty high tension eliminator. Following this fire a lecture was given to the Company's fitters on this particular risk, and the conditions pertaining on the premises immediately before the fire were faithfully reproduced. The operations carried out by the fitter were repeated about twenty times and each time ignition occurred and a fire resulted. This method of emphasizing the risk and the importance of applying preventive measures made a tremendous impression and was far more effective than any circularized instructions.

The author's thanks are due to Mr. R. J. H. Clark, M.Inst.Gas E., the Chief Engineer of the Plymouth and Stonehouse Gas Light and Coke Company, for the courteous permission which enables him to publish these particulars.

Radiation Limited

Ordinary General Meeting

At the Annual Meeting of the Company held at The Incorporated Accountants' Hall, Victoria Embankment, London, W.C., on the 27th March, 1935, the Chairman, Mr. H. James Yates, said:—

The Directors' Report and Balance Sheet have been in your hands for some days, and therefore following our usual procedure I presume that you will take them as read.

Before formally moving the adoption of the Report and Balance Sheet, I will comment on certain of the items in the Accounts.

Turning to the Profit and Loss Account on page 5 of the Accounts, you will see that the amount brought forward from 1933 is £116,354. The Net Income from Subsidiary Companies for the year, together with Transfer Fees and Bank Interest, amounts to £325,340, which is £25,375 in excess of the corresponding amount for the previous year.

After deducting the Interim Dividends paid last October there remains to the credit of the Profit and Loss Account the sum of £361,613, which is carried to the Balance Sheet: of that amount there has been reserved the sum of £233,511 for the proposed Final Dividends and the Bonus of 2½ per cent., leaving a balance to Profit and Loss Account of £128,102, which it is proposed to carry forward to next year.

On the Assets side of the Radiation Balance Sheet the principal amount of £3,802,078 consists of the cost to Radiation of the Investments in Subsidiary Companies £2,392,675 (which is the same figure as last year) and the amount £1,409,403 due from those Subsidiary Companies to Radiation. The latter amount includes Dividends for 1934 declared by the Subsidiary Companies to be paid to Radiation; also Balances of Dividends for past years, and Charges paid in the first instance by Radiation on behalf of Subsidiary Companies.

No other item in the Radiation Balance Sheet calls for special comment, and therefore I will now turn to the statement of Combined Assets and Liabilities of the Subsidiary Companies on pages 6 and 7 of the Accounts.

The largest item on the Liability side of the Combined Statement is the amount £3,802,078, which corresponds to the amount to which I have just referred on the Assets side of the Radiation Balance Sheet.

With regard to the Liabilities, the Debentures issued by Subsidiary Companies were slightly reduced by redemption during the year. Since the date of these Accounts, however, the Debentures have been reduced still further by £26,000. Sundry Creditors, Taxation, and Contingency Reserves show no material change.

The balance to Credit of Profit and Loss Account of Subsidiary Companies is now £238,707 as compared with £138,923 at December, 1933.

Turning to the Assets side of the Combined Statement you will observe some modification in the figures for Freehold and Leasehold Land and Buildings, and Plant and Machinery, compared with the previous year, which you will understand arises by reason of depreciation and obsolescence provisions deducted from the book values and additions to Buildings and Plant which have been made during the year. The total of these Assets now stands at £1,071,056, which is £65,630 less than the amount at the end of 1933.

Investments now stand at £2,081,959, compared with £1,875,473 a year ago.

The Current Assets, exclusive of Investments, and comprising Stocks, Sundry Debtors and Cash, total £1,631,546, compared with £1,580,594 for last year, an increase in the liquid position of £50,952.

In the Directors' Report you have been advised that the Board has recommended the payment of a Bonus of 2½ per cent., less Income Tax, on the Ordinary Share Capital of the Company, in addition to the customary Dividend of 12½ per cent. for the year.

The expansion in sales which has taken place during the past year has enabled the Company to introduce many improvements in apparatus without increasing selling prices, and, despite higher costs, to maintain its profits at a satisfactory level.

Your Directors feel that the Shareholders should participate also in these favourable results for last year, and this has prompted them to recommend the payment of this Bonus.

I know you will be glad to hear that the sales of our "New World" Cookers during the past year have exceeded all our forecasts and, extensive though our advertising propaganda is, nevertheless the millions of satisfied users of our cookers in various parts of the world are our best advertisement.

On several occasions I have told you that, as the result of our Research work, extending over a long period, we were enabled to produce the "New World" Cooker, with its single burner at the back of the oven, direct bottom-flue-outlet and "Regulo" control, which has placed domestic cooking on an altogether higher plane than had previously been attained. Although its principles have, naturally, been followed by other Manufacturers, yet our "New World" Cooker with its "Regulo" remains in a class by itself. Human nature being what it is, there will always be copyists, and it has been necessary for us to take steps, in some instances, to moderate the enthusiasm of these admirers. No one has succeeded in producing a gas oven, with thermostatic control, worthy to be compared to our "New World" Cooker fitted with the "Regulo," and at this point I cannot emphasise too strongly that the "Regulo" is made solely by Radiation, and is only to be obtained with Radiation apparatus.

The Radiation Cookery Book is now in its 18th edition. The recipes and menus have been prepared and tested by our own staff of expert cooks in the Radiation Research Kitchen. This Kitchen is regularly visited by professional cooks from all parts of this country, and from abroad. With the Radiation Cookery Book, and the "New World" Cooker, the novice in cooking has nothing to fear, and the more experienced cook has also the satisfaction of knowing that her successful results can be repeated with certainty from day to day.

Last year I referred to the fact that the paper used for the printing of our Cookery Book if stacked in reams would form a column nearly three times the height of St. Paul's Cathedral. So large has been the demand for this book during the past year that the height of the column of paper would now be nearly four times the height of St. Paul's.

It is very many years since I first instituted Research work in our business. The work gradually extended in scope, and in course of time new Research Laboratories were built, of which there was a formal opening attended by many Engineers and Scientific men. That was many years ago and in those early days Research work—as applied to Industry—was looked upon with much scepticism, but I have always pinned my faith to scientific development in business. In course of time each of our Works had its own Research Laboratory carrying on, under control, investigation of numerous problems. Eventually we decided to carry on all Pure Research in one Central Laboratory. This was established at Radiation House, and Sir David Milne-Watson, the Governor of the Gas Light and Coke Company, of London, did us the great honour of formally opening these Laboratories on the 1st October, 1925. In 1933 he did us the further honour of formally opening our new Research and Demonstration Kitchen at Radiation House.

For a number of years we have been investigating the types of energy emitted by various heating apparatus. This work involved the determination of the intensity of the energy of various wave-lengths emitted, but in the early years it was very difficult to obtain the apparatus to carry on this work, and owing to extraneous electrical disturbances and the vibrations due to traffic, trains, &c., during the day, the work could only be carried on for a few hours during the night. However, we were able to devise means through which, by the use of special apparatus, these difficulties were overcome. Everyone knows the beneficial effects of the sun's rays, and it was our endeavour to produce a gas fire which would be bright, without glare, and at the same time emit a more comforting warmth than had previously been attained.

Certain of the sun's rays, the short infra-red, when they fall on the surface of the human body, penetrate more deeply than do the long infra-red rays, and the visible rays penetrate still more deeply. The penetration of the heat stimulates the flow of blood through the fine capillaries which lie near the surface, and leads to a sensation of warmth without dryness of the skin. Our "Thermo-XX-Beam" radiant, which eventually became known as the "Beam," was the first radiant designed to emit an increased proportion of short infra-red rays, and its introduction marked a new stage in the development of the gas fire. The High "Beam" fire, to which I shall refer presently, is a further advance in this direction.

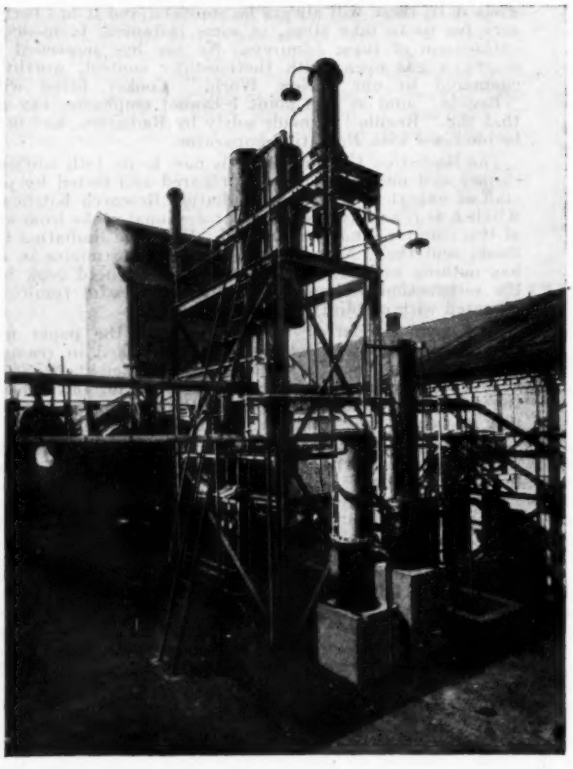
On January 29th, 1929, Professor Sir Leonard Hill in a letter to "The Times" referred to the value of the work carried out in our Research Laboratories. About this time he published in one of the Medical Journals a note giving the result of his experiments in the study of the increased resistance against staphylococcal infection afforded by exposure to red and short infra-red rays—experiments in which the energy used was obtained from "Beam" fires.

Continuing our study of this subject we produced the Clinical Gas Lamp, the energy from which has a penetrancy much higher than that attained with any other freely radiating source, heated by coal gas, of which we have knowledge. These lamps have been used in hospitals and clinics for the alleviation of the pain and discomfort caused by complaints such as Rheumatism, Neuritis, Lumbago, etc., and for the removal of the disfigurement caused by certain skin troubles such as acne. Whereas ultra-violet irradiation by the use of certain electrical appliances may not be undertaken by laymen without the risk of unpleasant after-effects, infra-red energy treatment can be carried out by the use of our Clinical Gas Lamps without fear of accidental over-exposure.

In the foregoing remarks I have really been giving you an epitome of things I have previously told you, but I do want

BENZOLE PLANT

FOR LARGE OR SMALL WORKS



Photograph of

Thorncliffe Type Benzole Recovery Plant installed at the Hampton Court Gas Company, Hampton Wick, Middlesex.

This particular plant will produce:—

1·85 gallons of Benzole per ton of coal distilling 93% at 120 degrees centigrade,

or

2·25 gallons of Benzole per ton of coal distilling 80% at 120 degrees centigrade.

The Thorncliffe type Benzole Plant specially constructed to meet the modern requirements of undertakings of varying sizes has the following outstanding advantages:—

1. Low Capital cost.
2. Existing Gas Washers can be adapted.
3. Low consumption of water, steam and wash oil.
4. Small ground space required.
5. Any quality of Benzole guaranteed from 70% to 95% at 120 degrees centigrade.
6. Any required variation in the product obtained by simple thumb screw adjustment.
7. Plants in operation can be inspected.
8. Fully guaranteed.

Write for full particulars and specification to:

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ur shareholders to realise the National work we have been oing for so long, and which, naturally and wisely, other eople are following.

We have a long lead and we shall continue to hold this ead provided your business is managed by practical men who ave devoted all their time and energies to your business. We re training others to come after us, and I hope in course of ime they will succeed in doing even better work than we ave done—but it is indeed a whole-time task for any of our eople who are hoping to occupy such positions, and they will ave a very gruelling and arduous schooling to pass through.

I made brief reference last year to our new High "Beam" as fire, with its self-lighting tap, first introduced towards the nd of 1933. This new fire is the result of many years of Re-earch work and is in advance of all other gas fires made. It s the most efficient radiant gas fire in the world. Our slogan s "One Therm saved in every eight and more warmth." The igh "Beam" fire is a radical departure from all other gas res. Long special Research has enabled us to produce a new ype of vertical radiant, together with an upper or "scrubber" adiant, the latter being placed above the vertical radiant, thus overing up the whole of the brick. These "scrubber" adiants not only abstract a further measure of heat from the as but, becoming heated, they add to the cheerful glowing ffect. There is no dull space above the radiants, and the whole f the fire opening is full of warmth.

One of the noticeable innovations in the High "Beam" fire s the new Radiation patent self-lighting gas tap. It is only ecessary to turn the tap, and the fire lights up automatically.

Another section of our business—and a very important one— s devoted to the various types of hot-water apparatus we anufacture, and it continues to make remarkable develop-ents. There is no doubt that the expansion of this section s largely due to the fact that our "Regulo" is used in a umber of different types of our hot-water apparatus. To be ble to have hot water "on tap," night or day, with absolute ertainty, is one of the greatest blessings in a home—particu-rly in cases of illness when hot water may be required at ny moment of the night or day.

I find that I have devoted most of my remarks to the Gas-tove side of your business. I do not wish you to infer, how-ver, that our activities are confined solely to this type of pparatus. We possess other valuable sections in addition. or example, we have a very large Foundry business; we are mong the most important makers in this country of en-melled baths, and our output runs into many thousands a ear.

We are also manufacturers on a large scale of numerous ypes of castings used in the Building and other Trades.

Then, as you know, one of our Subsidiary Companies is the agle Range and Grate Company Limited. This business was stablished well over 100 years ago, and although a number f people have entered this type of trade, the Eagle Range is till one of the best known throughout the world.

I would like now to make a reference to our Export Trade. otwithstanding the great difficulties we experience on account f very high tariff walls, the cost of freights, and the fact that ome countries have their own types of heating and cooking pparatus which differ from those used in this country, our xport Trade shows a healthy increase.

The firms constituting Radiation were the pioneers in the evelopment of domestic gas heating, cooking, and hot-water pparatus; they took the lead many years ago, and that lead ey still hold. There is no domestic gas apparatus to-day hich is not founded on the pioneer work of Radiation. In the arly days there was not available the background of scientific nowledge which is at our disposal to-day to serve as a guide n the design and manufacture of gas apparatus. Knowledge nd experience, whether it is to be applied to the making r to the testing of gas appliances, takes time to acquire. I mphasise this point because I wish to impress on Gas ndertakings, and the Public, that Radiation possesses a fund f accumulated specialised knowledge of these matters, together ith an organisation which is unequalled.

Our Research work is unceasing. Modern industry demands continuous search for new and more efficient methods of anufacture, the improvement of existing apparatus, as well as he development of new appliances. No manufacturing concern an afford to stand still, and you may rest assured that so long s the present policy is continued, Radiation will occupy the remier position it always has done in the Gas Appliance In-ustry.

At the conclusion of my address each year it always gives e very great pleasure to emphasise the fact that the results have been able to place before you for a number of years ast could not have been attained without the loyal support f all those in the employ of your Company, and I know hat you would wish me to convey to them your endorsement f my appreciation of their services.

I have pleasure in moving:—

"That the Directors' Report and Accounts for the year "ended 31st December, 1934, as presented by the Directors, "be received and adopted, and that Final Dividends "and Bonus be declared as follows:—3 per cent., less In-"come Tax, for the half-year to 31st December, 1934, on "the 6 per cent. Cumulative Preference Shares; 9⅜ per "cent., less Income Tax, on the Ordinary Shares, making, "with the Interim Dividend, a total Dividend of 12½ per "cent. on the Ordinary Shares for the year; and a Bonus "on the Ordinary Shares of 2½ per cent., less Income "Tax."

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(BRANCH OF METERS LTD.)

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FOR QUALITY.

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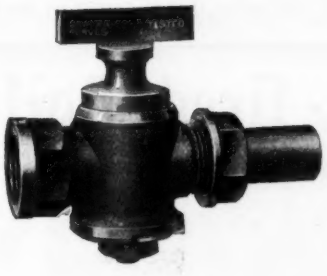

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GRAMS: SAWER MANCHESTER

Gas Undertakings' Results for 1934

Barnard Castle.

At the annual meeting of the Barnard Castle Gas Company, Mr. C. J. Smith presiding, a gross profit of nearly £615 was reported, and after providing for bank loan interest, mortgage debenture interest, income-tax, &c., a dividend for the year of 2½% on the original consolidated stock and £1 15s. 7d.% on the new ordinary stock, less tax, was approved. Messrs. W. R. Scott and J. Ingram have been appointed Directors in place of the late Colonel H. C. Watson, who held the position for 27 years, and Mr. J. G. Hall, who was a Director for 24 years.

Bridgwater.

The Directors' report of the Bridgwater Gas Light Company and the statement of accounts for the year ended Dec. 31, 1934, show that there has been a small increase in the sales of gas, which, having regard to the mildness of the season, is considered very satisfactory. The number of consumers is 5,024, an increase of 168, and the number of appliances on hire and hire-purchase is 4,230, while the sales of apparatus during the year show a very considerable increase over previous years. The accounts submitted show that after payment of income-tax, debenture interest, interim dividend, &c., and carrying £237 to the renewal fund, there is a balance of £6,724 14s. 4d., which can now be dealt with. The Directors recommended the payment of a final dividend of 4%, less income-tax, making 7½% for the year. From the balance available they recommended that £1,100 be carried to the reserve fund, and the remaining balance carried forward to the next year's accounts.

Corbridge.

At the annual meeting of Corbridge Gas Company, Mr. George Renwick, Chairman, said there had been a satisfactory result from the gas exhibition held by the Company last year and also that the sales of gas had increased nearly 2%. The accounts showed a gross profit of £1,010, and a dividend of 6%, less tax, was approved. It was decided to make a donation of £3 3s. to the Charlotte Straker Cottage Hospital and of £1 1s. to the local Red Cross Society.

Dartmouth.

The Directors' report and statement of accounts for the year ended Dec. 31, 1934, show that the profit on the year's working (after charging to revenue all renewals, repairs, and maintenance, and depreciation on meters and gasholders) is £2,077. After charging £280 interest on mortgage debentures and £8 interest on the first preference shares, and £128 for income-tax, there remains a balance available for distribution of £2,277. The Directors recommend the payment, less income-tax, of the full dividend of 6% on the second preference shares, absorbing £312, and a dividend of 11% on the ordinary shares, absorbing £1,254, and purpose carrying the sum of £500 to the general reserve fund account, leaving a balance to be carried to the next account of £211.

Guildford.

The report of the Directors of the Guildford Gas Light and Coke Company for the year ended Dec. 31, 1934, states that the sale of gas shows an increase of 16,200,772 c.ft., or 4%, on the previous year. The balance standing to the credit of the profit and loss accounts, including the amounts brought forward, is £21,438. The Directors recommend payment of final dividend (less tax) as follows: On the 5% preference stock 2½%, making 5% for the year, on the 6% preference stock 3%, making 6% for the year, and on the consolidated ordinary stock 4%, making 8% for the year, compared with 7½% for 1933. This will absorb £6,227, leaving to be carried forward £15,211. The reserve fund stands at £12,629.

Leamington.

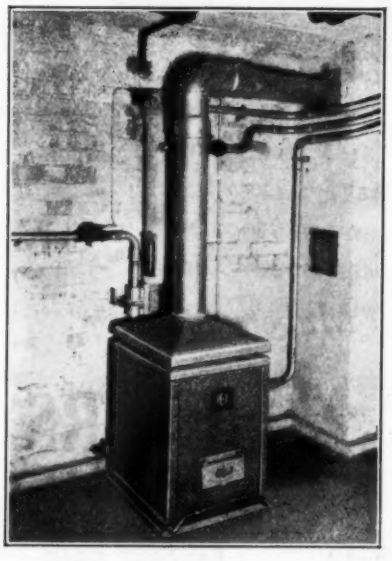
At the 140th ordinary general meeting of the Leamington Priors Gas Company the Chairman, Dr. Harold Mason, J.P., said that, bearing in mind the extraordinarily mild weather, they had been extremely fortunate in obtaining a revenue from gas for the half year within £150 of that for the December half of 1933. Actually, the quantity sold showed a slight increase, the drop in revenue being due to a substantial increase in the gas supplied for industrial purposes. The increased revenue from coke was an indication that the value of this most important by-product was being more and more appreciated by customers who recognized the value of a reliable smokeless fuel. Suitable coke grates specially designed for burning gas coke were now available.

Luton.

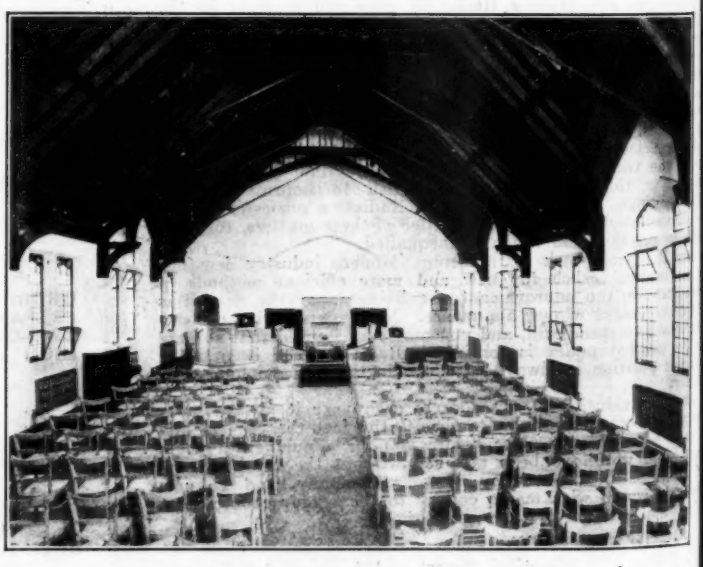
An increase of nearly 7% in the sales of gas is reported by the Luton Gas Company. The Directors' report states that the number of consumers has increased by 1,377 during the ye

Gas-fired Boilers for Church Warming

A POTTERTON INSTALLATION
in a Baptist Church at Carshalton Beeches



The illustration above shows the No. 1 Series "REX" Boiler of three sections fitted in a basement Chair Store. The Boiler is also used for heating the Baptistry. On the right is a view of the church showing the radiators with circulations at skirting line.



Thomas Potterton (Heating Engineers) Ltd.
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nd the quantity of gas sold was 4,210,284 therms (859,241,700 ft.). After providing for the debenture interest and other harges, transferring £302 to the reserve fund, and the payment f the dividend for the half-year ended June 30, 1934, there re-ains a balance of £20,699 on the net revenue account from hich the Directors recommend the payment of dividends, less ncome-tax, for the half-year ended Dec. 31, 1934, at the follow-g rates: £2% on "B" preference shares making £4% for he year, £2 10s.% on the "C" preference shares making £5% or the year, £4 7s. 6d.% on the consolidated ordinary stock "A," making £8 15s.% for the year, £3 12s. 6d.% on the con-olidated ordinary stock "B," making £7 5s. for the year, and o place £302 to the reserve fund. The Directors report with egret the death of Mr. George Henry Latchmore, who had been Director for 25 years.

Prescot.

The report of the Directors of the Prescot and District Gas Company and statement of accounts for the year ended Dec. 31, 934, show that there is an amount available for dividend of £8,254. Full statutory dividends are declared on the 5% ordi-ary consolidated shares, 6% preference shares, 6% redeemable reference shares, and preference "C" stock. During the past ear the Directors report an abnormal demand for gas for in-ustrial purposes. The increase in the quantity of gas sold mounted to 140 million c.ft. against 121 million c.ft. in 1933. he demand from general consumers in the district is increas-ng. A waste-heat boiler has been installed, and the exhaust-ng, condensing, and washing plant replaced by new and larger pparatus. The £7,500 6% redeemable preference stock being ue for repayment on May 1, 1935, arrangements have been ade for the issue of 4½% preference stock to replace this.

Ramsey.

At the annual general meeting of the Ramsey Gas Light Com-any, Ltd., it was stated that profits amounted to £820, as gainst £1,252, a decrease of £432. The decrease was attribut-ble to increased expenditure on repairs and maintenance of Works. Gas sales amounted to £7,071, against £7,123. The re-eipts for residuals, fittings, meters, and stoves amounted to £2,690, against £2,513.

St. Austell (S.W. Gas and Water Corporation).

The report of the Directors of the St. Austell Gas Company, Ltd., for the year ended Dec. 31, 1934, states that during the ear an offer was received from the South-Western Gas and Water Corporation, Ltd., to purchase the ordinary share capital of the Company. The Board decided, after very careful consideration, that the offer was one which they felt justified in accepting themselves and recommending to the shareholders to accept. As a result the Corporation acquired over 99% of the shares of the Company. The Directors are confident that the change will prove beneficial to the Company and its consumers. On completion of the sale of shares to the Corporation Mr. G. T. Petherick, J.P., and Mr. W. H. Hitchins resigned their Directorships in favour of Lt.-Col. James Reid Hyde, C.B.E., and Mr. C. Lewis Rosewarne, C.C., the nominees of the South-Western Gas and Water Corporation. The Directors take this opportunity of expressing their very sincere appreciation of the valuable services rendered to the Company by Mr. Petherick and Mr. Hitchins. During the year the Company's mains have been extended to Holmbush and Crinnis. The balance standing to the credit of profit and loss account, amounting to £2,196, the Directors recommend should be appropriated as follows: Dividend at the rate of 8½% per annum on old shares, £765, dividend at the rate of 7% per annum on new shares, £333, and carry to reserve fund the sum of £200.

St. Blazey (S.W. Gas and Water Corporation).

The report of the Directors of the St. Blazey Gas Company, Ltd., for the year ended Dec. 31, 1934, states that on completion of the sale of the ordinary share capital of the Company to the South-Western Gas and Water Corporation, Ltd., which was referred to in the last report, Dr. E. S. S. Davis and Messrs. J. Job, J. G. Treleaven, and N. Rowe resigned their Directorships in favour of Lt.-Col. J. Reid Hyde, C.B.E., Mr. S. J. Ingram, M.Inst.Gas E., Mr. C. Lewis Rosewarne, C.C., and Mr. F. J. Nettle, the nominees of the South-Western Gas and Water Corporation. The Directors take this opportunity of expressing their very sincere appreciation of the valuable services rendered to the Company by the gentlemen who resigned from the Board. Mr. F. J. Nettle, who has been Manager and Secretary of the Company since its formation over 42 years ago, has been relieved of his duties as Manager, and Mr. R. Morton has been appointed Engineer and Manager to the Company. During the year a showroom has been opened at 22, Fore Street, St. Blazey, and is proving of great benefit to the Company. The balance standing to the credit of profit and loss account, amounting to £794, the Directors recommend should be appropriated as follows: Dividend at the rate of 7½% per annum on ordinary shares, £540, dividend at the rate of 6% per annum on preference shares, £150. A sum of £159 is being carried forward to next account.

(*Further Gas Undertakings' Results will be found on page 56.*)

THE
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SELF-ADJUSTING PIPE JOINT

THE STANTON-WILSON SELF-ADJUSTING PIPE JOINT enables over 500 miles of spun iron mains to adjust themselves to the subsoil movements caused by ground subsidence and traffic vibration. Owing to the flexibility of the joints, these mains were laid with very few specials.

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Fitted with "Carrontrol" Patent Automatic Heat Controller

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WHICH regulates and maintains temperature of oven to any degree required, and permits different kinds of food being cooked at one time. This Cooker also embodies many fresh and interesting features, and is a decided advance in high efficiency Gas Cookers.

Attractive and hygienic mottled enamel finish —Easily removed plain Hotplate Bars—High efficiency four-flame type boiling burners—Improved grill-box, etc.

No. 660 GAS COOKER.
Fitted with "Carrontrol" Patent Automatic Heat Controller.

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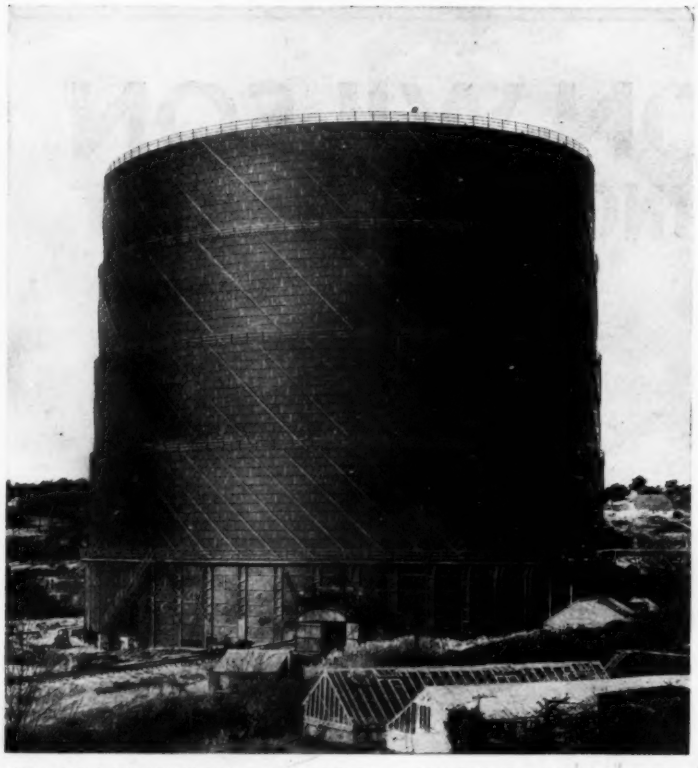

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Gas Markets and Manufactures

Stock Market Report

(For Stock and Share List, see later page)

The political uncertainty continued a stumbling block to any progress last week, and the general apathy was further accentuated by the nervousness in the Foreign Exchange market. It was not surprising, therefore, that despite a short spurt of business at the outset, any improvement in prices soon disappeared, and values in nearly all sections were again marked down. Most of the business was concentrated on the latest new issues, nearly all of which were over-subscribed.

Business in the Gas market was again considerably curtailed in sympathy with the general position, and prices weakened as the week progressed, with the result that a number of stocks, particularly ordinaries, suffered a further relapse. The chief falls in ordinary stocks occurred in Imperial Continental, which dropped 10 points to 195, and Plymouth and Stonehouse with a similar amount to 170½; Shrewsbury fell 7 to 140½, while Sheffield and Wandsworth both weakened 4. Gas Light units eased a further 3d. to 25s. 6d., and South-Eastern Gas Corporation shares dropped 6d. to 28s. Several debenture stocks also reacted, and the yield obtainable on many of these is now very little below 4%.

Current Sales of Gas Products

The London Market for Tar Products.

LONDON, *April* 1.

The prices of tar products remain as quoted on March 25, namely: Pitch, 40s. to 42s. 6d. per ton f.o.b.

Creosote, 5½d. to 5¾d.

Refined tar, 4d. per gallon in bulk at makers' works.

Pure toluole, 2s. 1d. to 2s. 3d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, 1s. 5d., and 90/160 pyridine, about 5s. 9d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

April 1.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 25s. Pitch—East Coast, 40s. to 41s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 40s. to 41s. 6d.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 6¼d. to 6¾d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 4¾d. Heavy naphtha, North, 9¾d. to 10¾d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¼d. to 4½d.; low gravity, 4⅜d. to 4½d.; Scotland, 4⅜d. to 4½d. Heavy oils, in bulk, North, 4d. to 4¼d. Carbolic acid, 60's, 1s. 9d. to 1s. 10d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *March* 30.

While prices show little or no alteration, conditions remain quiet.

Crude gas-works tar.—Actual value remains at 29s. to 31s. per ton *ex* works in bulk.

Pitch remains nominal at 40s. to 42s. per ton f.o.b. Glasgow for export and 40s. per ton *ex* works in bulk for home trade.

Refined tar is offered freely at 3d. to 3½d. per gallon naked at makers' works.

Creosote oil.—Values continue firm, but new business is not too plentiful. Stocks are well sold forward on contract. B.E.S.A. Specification, 4⅞d. to 5¼d. per gallon; low gravity, 4⅞d. to 5¼d. per gallon; and neutral oil, 4⅜d. to 5d. per gallon; all f.o.r. in bulk.

Cresylic acid is rather dull, although makers continue to hold for the following prices: Pale, 97/99%, 1s. 3d. to 1s. 4d. per gallon; dark, 97/99%, 1s. 1d. to 1s. 2d. per gallon; and pale, 99/100%, 1s. 4d. to 1s. 5d. per gallon; all *ex* works.

Crude naphtha is steady at 4¼d. to 4⅜d. per gallon, according to quality and district, with supplies on the short side.

Solvent naphtha.—90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 heavy is 10d. to 11d. per gallon.

Motor benzole is uninteresting at 1s. 2½d. to 1s. 3½d. per gallon in bulk *ex* works.

Pyridines.—90/160 grade is 5s. 6d. to 6s. per gallon, and 90/140 grade 6s. to 6s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

		s.	d.		s.	d.	
Crude benzole		0	8½ to		0	9	per gallon at works
Motor	,,	1	2	,,	1	2½	,, ,, ,,
90%	,,	1	3	,,	1	3½	,, ,, ,,
Pure	,,	1	6½	,,	1	7	,, ,, ,,

Contracts Advertised To-Day

Coal.

Severn Valley Gas Corporation. [p. 60.]

Main Laying.

Northallerton Consumers Gas Company, Ltd. [p. 60.]

Meter Test Gasholders, &c.

Darlington Gas Department. [p. 60.]

Painting.

Bexhill Gas Department. [p. 60.]

Pipes and Specials.

Northallerton Consumers Gas Company, Ltd. [p. 60.]
Tipton Gas Department. [p. 60.]

Plant.

Bexhill Gas Department. [p. 60.]

Retorts.

Burnley Gas Department. [p. 60.]

Trade Notes

Jubilee Decorations.

A folder has been published by Dennison-Victor Company, Ltd., of Park Royal, N.W. 10, descriptive of their special lines for the forthcoming Jubilee Celebrations displays, including coloured banners and all forms of crêpe paper decorations for window displays and similar purposes.

Overseas Opportunities

The Commercial Counsellor to H.M. Embassy at Buenos Aires reports that the Argentine State Oilfields Directorate are calling for tenders, to be presented in Buenos Aires by April 15, 1935, for the supply of 20,000 metres of seamless tubes 54 m.m.o.d. and 45 m.m.i.d., with an A.P.I. thread, 11½ threads per inch. (Ref. G.Y. 14,927.)

Further Gas Undertakings' Results

Torquay.

The report of the Directors of the Torquay and Paignton Gas Company and statement of accounts for the year ended Dec. 31, 1934, show a balance of £33,841 to the credit of the profit and loss account. The Directors recommend that, after allowing for the interim dividend paid on Oct. 1 last, the full year's dividend be declared, and that the balance be remitted, less income-tax, to the shareholders on April 1. The Directors are gratified to be able to report a further increase of 28¾ million c.ft., or 4·78% in the sale of gas, the total sale for the year amounting to over 630 million c.ft., while the number of appliances disposed of constitutes a record in the history of the Company.

Wellington (New Zealand).

The Directors of the Wellington Gas Company, Ltd., in their sixty-fifth annual report and statement of accounts for the year ended Dec. 31, 1934, state that they have been able to maintain a dividend on ordinary shares of 8% per annum. During the past year 1,027 services were connected, and 1,843 cookers installed. After payment of the interim dividend of 4% on the ordinary shares, the year's dividend on the preference shares, and providing for depreciation of plant, buildings, and machinery, also debenture redemption fund and insurance fund, the balance to the credit of profit and loss appropriation account amounts to £25,922. It is recommended that this sum should be appropriated as follows: To payment of a further dividend of 4% (making 8% for the year), £11,152, and carry forward the balance of £14,769.

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WEST'S CARBONIZING & FUEL-HANDLING SYSTEMS

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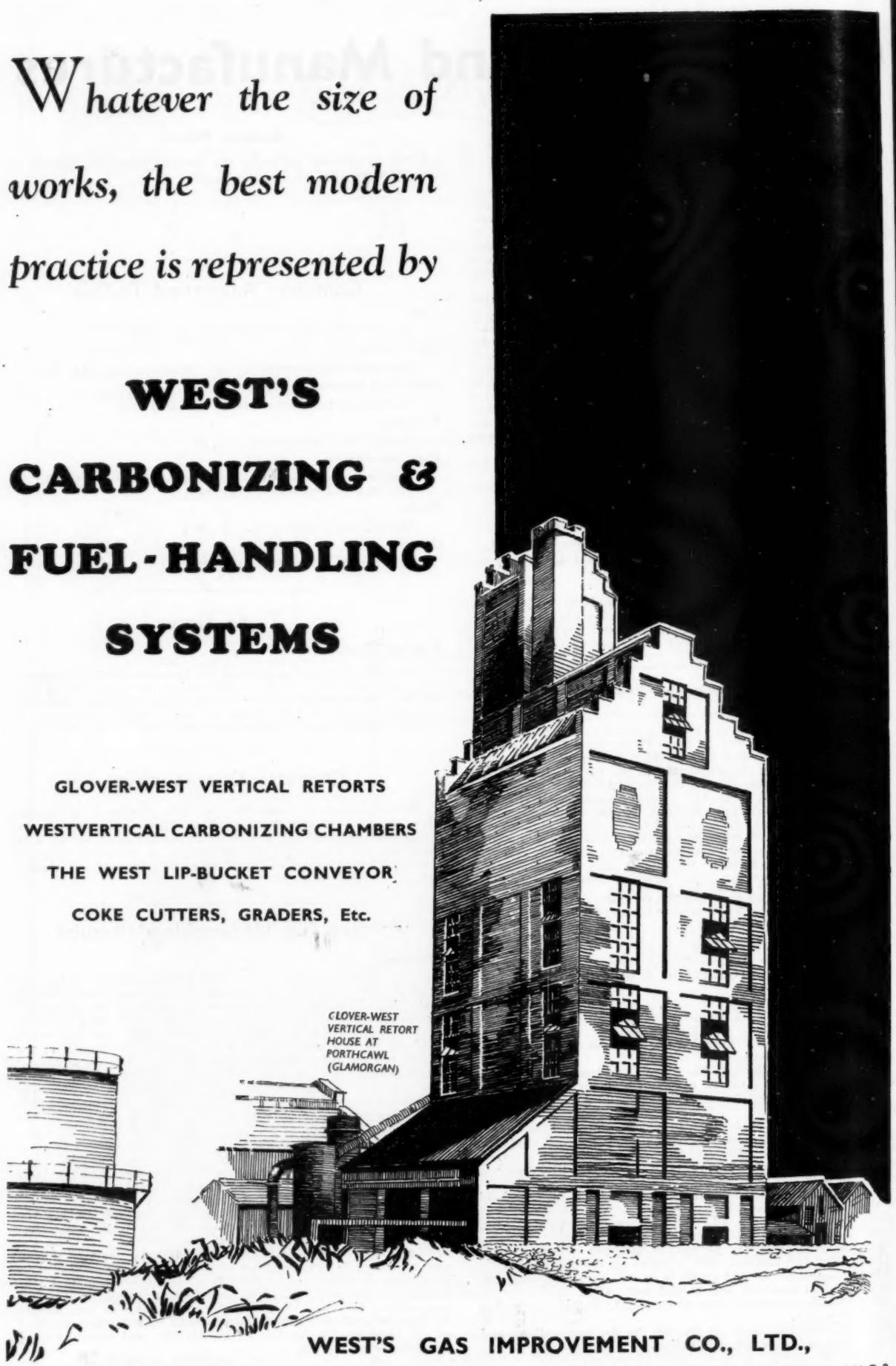
WESTVERTICAL CARBONIZING CHAMBERS

THE WEST LIP-BUCKET CONVEYOR

COKE CUTTERS, GRADERS, Etc.



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STOCK AND SHARE LIST

Official Quotations on the London and Provincial Stock Exchanges

Issue.	Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, March 29.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
£								
1,551,868	Stk.	Mar. 11	7	7	Alliance & Dublin Ord. ...	125—135	–3	130½—130½
374,000	,,	Dec. 17	4	4	Do. 4 p.c. Deb. ...	90—100	...	...
557,655	,,	Feb. 18	7	7	Barnet Ord. 7 p.c.	165—170	–2	...
300,000	£1	Oct. 8	1.9.	1.4.	Bombay, Ltd.	29 —31	–1/–	...
178,480	Stk.	Feb. 18	9½	9½	Bournemouth sliding scale ...	220—230	...	...
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	167—172	...	...
439,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	147—152	...	...
50,000	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	86—91	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	104—109	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	125—130	–2	...
357,900	,,	Feb. 18	7½	7½	Brighton, &c., 6 p.c. Con. ...	170—175	–2½	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	153—158	...	155½
205,500	,,	,,	6	6	Do. 6 p.c. B. Pref.	145—150	...	146—149½
1,487,500	,,	Feb. 4	5	5	Bristol, 5 p.c. max.	118—119*a*	...	...
120,420	,,	Dec. 17	4	4	Do. 1st 4 p.c. Deb. ...	102—104*a*	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	102—104*a*	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	122—124*a*	...	...
855,000	,,	Mar. 11	7	8	British Ord.	157—167	...	...
100,000	,,	Dec. 17	7	7	Do. 7 p.c. Pref.	160—165	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	111—116	...	...
100,000	£10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	£10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk	Dec. 17	4½	4½	Do. 4½ p.c. Deb. ...	88—93	...	...
626,860	,,	Jan. 21	6	6	Cardiff Con. Ord.	130—135	...	...
237,860	,,	Dec. 17	5	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	,,	Feb. 4	5	6½	Chester 5 p.c. Ord.	111—116b	...	...
98,936	£1	Mar. 25	2/–	2/–	Colombo, Ltd., Ord.	1½—1¾*	...	...
24,500	£5	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	20 6—22 6*	–/6	...
609,204	£1	Mar. 25	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	20 —22 –*	–/6	...
296,053	£1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	24/6—26 6*	–/6	...
1,775,005	Stk.	Feb. 4	5	6	Commercial Ord.	114—119	...	113½—117
475,000	,,	Dec. 3	3	3	Do. 3 p.c. Deb. ...	83—88	–2	86½—87
286,344	,,	Feb. 18	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
807,560	,,	Feb. 18	7	7	Croydon sliding scale... ...	155—160	...	159—159½
569,590	,,	,,	5	5	Do. max. div.	112—117	–1	114—116
620,385	,,	Dec. 17	5	5	Do. 5 p.c. Deb.	125—130	–3	125
542,270	,,	Feb. 18	7	10	Derby Con.	190—200c	...	...
55,000	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	100—105c	...	...
239,000	,,	Feb. 4	5	5	East Hull Ord. 5 p.c.	111—116	...	...
181,625	,,	Feb. 4	6	6	East Surrey Ord 5 p.c. ...	131—136	...	...
175,609	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
1,002,180	,,	Mar. 11	†5	†7	European, Ltd.	111—116	...	112½—115
19,313,481	,,	Feb. 4	5½	5½	Gas Light & Coke 4 p.c. Ord.	25 —26 *-f*	–/3	24/6—25/6
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	85—90	–1	88½—90
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	104—109	...	104½—106½
6,102,497	,,	Dec. 3	3	3	Do. 3 p.c. Con. Deb. ...	87—92	...	89½—91½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115—120	...	115—117
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	111—116	–2	112—114
270,466	,,	Feb. 18	6	6	Harrogate New Cons.	135—140	...	...
140,000	£1	Mar. 25	1/7½	1/7½	Hongkong & China, Ltd. ...	1¼—1¼*	–½	...
213,200	Stk.	Feb. 18	6	6	Hornsey Con. 3½ p.c.... ...	128—138	...	...
5,600,000	,,	Oct. 22	14	10	Imperial Continental Cap. ...	190—200	–10	190—203
223,130	,,	Jan. 21	3½	3½	Do. 3½ p.c. Red. Debs.	91—96	...	94—95
285,242	,,	Feb. 18	8½	8½	Lea Bridge 5 p.c. Ord. ...	172—182	...	...
2,167,410	,,	Feb. 18	6	6	Liverpool 5 p.c. Ord.... ...	134—138*b*	...	...
245,500	,,	Dec. 17	5	5	Do. 5 p.c. Red. Pref. ...	105—110*b*	...	...
306,083	,,	Jan. 16	4	4	Do. 4 p.c. Deb.	104—107*b*	...	...
165,736	,,	Feb. 18	8	10	Maidstone 5 p.c. Cap. ...	185—195	...	...
63,480	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	83—88	...	...
75,000	,,	Dec. 3	†10	†10	Malta & Mediterranean ...	205—215	...	210
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	102—107	...	...
231,978	Stk.	Feb. 4	5	5	M. S. Utility "C" Cons. ...	110—115	...	112
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	103—105
360,075	,,	Dec. 17	4	4	Do. 4 p.c. Deb. ...	102—107	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb.	125—130	...	...
125,000	—	Jan. 2	11/8	3½	Do. 3½ p.c. Rd. Rg. Bds.	98—101	...	...
675,000	,,	May 28	†6	†3	Montevideo, Ltd.	50—60	–5	...
2,061,315	,,	Feb. 18	5	5½	Newcastle & Gateshead Con.	24/—25/-*ff*	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	106—107*d*	...	...
776,706	,,	Dec. 17	3½	3½	Do. 3½ p.c. Deb. ...	101½—102½*d*	...	...
277,285	,,	Oct. 8	5	5	Do. 5 p.c. Deb. '43 ...	105—107*d*	...	...
274,000	,,	Feb. 4	5	5	Newport (Mon.) 5 p.c. max....	108—110*a*	...	...
225,000	,,	Feb. 18	7½	7½	North Middlesex 6 p.c. Con.	170—175	–2	...
396,160	,,	Feb. 4	5	5	Northampton 5 p.c. max. ...	105—110	...	...
300,000	,,	Nov. 5	†7	†9	Oriental, Ltd.	170—175	...	...
416,617	,,	Dec. 17	8	8	Plym'th & Stonehouse 5 p.c.	168—173	–10	...
504,416	,,	Feb. 4	8	8½	Portsm'th Con. Stk. 4 p.c. Std.	173—178	–7	182
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	110—115	...	112—113
114,000	,,	Jan. 121	5	5	Preston 5 p.c. Pref.	108—113	...	...
1,736,968	Stk.	Feb. 18	6	6	Sheffield Cons.	140—142*e*	–4	...
95,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	103—106*e*	...	...
133,201	,,	Feb. 18	8½	5	Shrewsbury 5 p.c. Ord. ...	138—143	–7	...
90,000	£10	May 28	†4	†3	South African	3—4	...	73/6
1,061,779	£1	Sept. 10	1/2½	1/2½	South East'n Gas Cn. Ld. Ord.	27/—29/-	–/6	27/—28/-
845,016	£1	Mar. 11	–/10½	–/10½	Do. 4½ p.c. Red. Cum. Pref.	22/—23/-	...	21 9—22/9
450,000	Stk.	Feb. 4	74/4	4	Do. 4 p.c. Red. Deb. ...	100—103	...	...
6,709,895	,,	Feb. 4	5	6½	South Met. Ord.	120—125	–2	122½—125½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	147—152	...	148
850,000		,,	4	4	Do. 4 p.c. Irred. Pf. ...	103—108	–1	...
1,895,445	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	86—91	...	88—88½
1,000,000	,,	Jan. 7	5	5	Do. 5 p.c. Red. Deb....	113—118	...	...
209,820	,,	Feb. 18	8½	8½	South Shields Con.	174—176*d*	...	...
1,543,795	,,	Feb. 18	6	6	South Suburban Ord 5 p.c. ...	128—138	–2	129—131
512,825	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	122—125
500,000	,,	,,	4	4	Do. 4 p.c. Pref. ...	102—107	...	103
888,587	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	124—129	–4	124—126
250,000	,,	,,	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
647,740	,,	Feb. 4	5	5	Southampt'n Ord. 5 p.c. max.	114—119	...	...
121,275	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	102—107	...	...
350,000	,,	Feb. 4	5½	5½	Swansea 5½ p.c. Red. Pref. ...	113—118	...	118
200,000	,,	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb. ...	100—105	...	...
1,076,490	,,	Feb. 18	6½	6½	Tottenham and District Ord.	148—153	–2	150
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	131—136	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
199,005	,,	Dec. 3	4	4	Do. 4 p.c. Deb. ...	103—108	...	107—107½
369,774	,,	Feb. 4	7	7	Uxbridge, &c., 5 p.c.	150—155	–3	...
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
1,326,700	,,	Feb. 4	7	7	Wandsworth Consolidated ...	152—157	–4	157—159
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	...
1,317,964	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	126—131	–1	129—131
208,300	,,	,,	26/8	4	Do. 4 p.c. Deb. ...	104—109	...	...
158,400	,,	Feb. 18	5	6*g*	Winchester W.& G. 5 p.c. Con.	116—121	...	...

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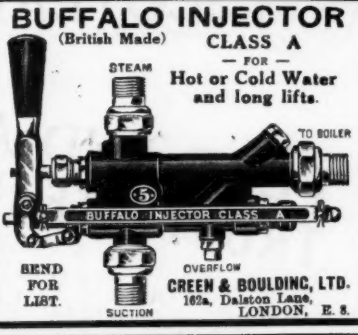

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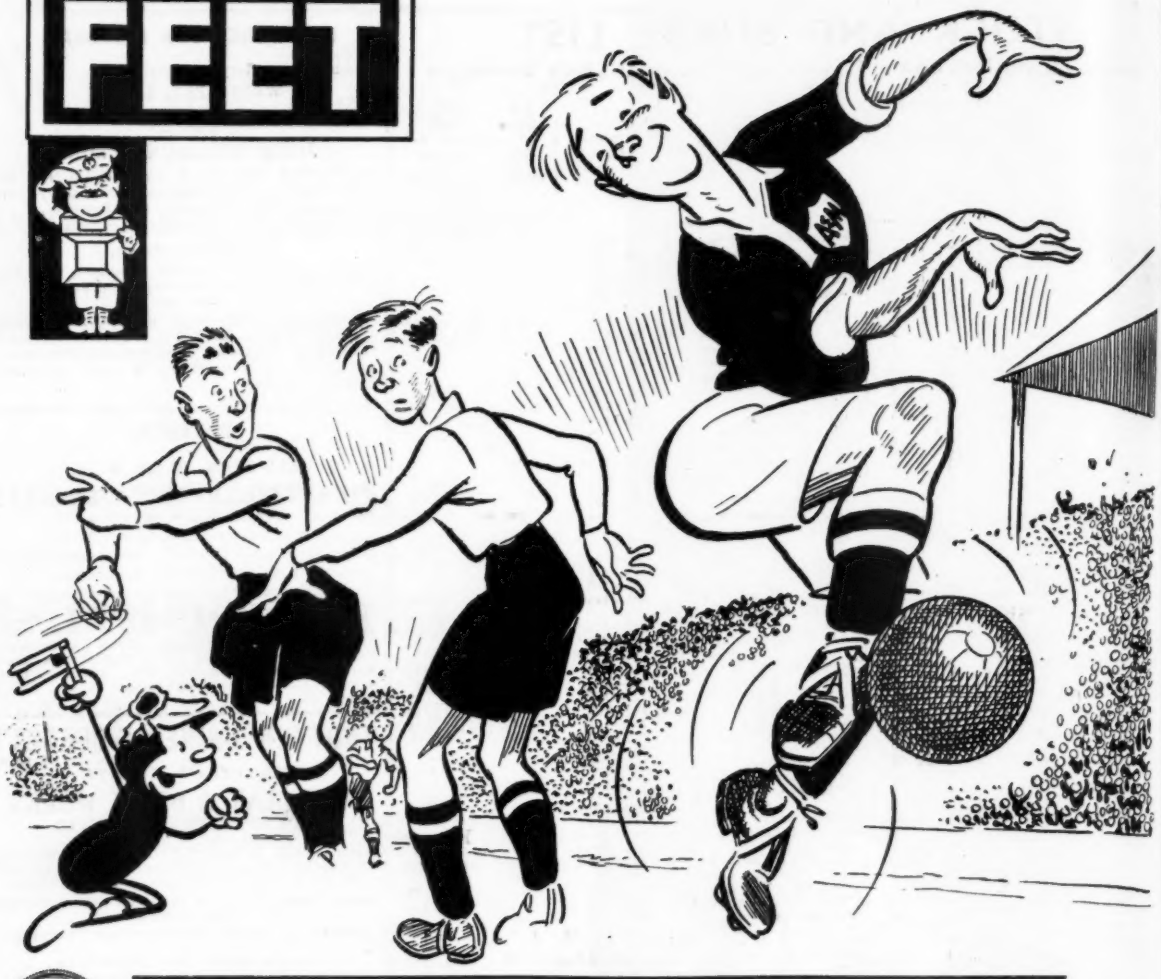

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